RECORD OF DECISION

DONNA RESERVOIR AND CANAL SYSTEM SUPERFUND SITE

DONNA, HIDALGO COUNTY, TEXAS
EPA ID: TX0000605363

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 6
DALLAS, TEXAS

SEPTEMBER 2018

100011997

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LIST OF ACRONYMS AND ABBREVIATIONS

95% UCL	95 percent upper confidence limit
µg/kg	microgram(s) per kilogram
ADI	average daily intake
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
Cleanup Level	CUL
COC	chemical of concern
COPC	chemical of potential concern
CWA	Clean Water Act
DRCS	Donna Reservoir and Canal System
EA	EA Engineering, Science, and Technology, Inc., PBC
EPA	U.S. Environmental Protection Agency
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
GI ABS	gastrointestinal absorption factor
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IBWC	International Boundary and Water Commission
IRIS	Integrated Risk Information System
Irrigation District	Donna Irrigation District Hidalgo County Number One
LRGVES	Lower Rio Grande Valley Environmental Study
mg/kg	milligram(s) per kilogram
mg/kg bw-day	milligram(s) per kilogram body weight per day
mg/kg-day	milligram(s) per kilogram per day
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

PCBs	polychlorinated biphenyls
pg/L	picogram(s) per liter
ppm	part(s) per million
PRPs	Potentially Responsible Parties
PRG	Preliminary Remediation Goal
PPRTV	Provisional Peer Reviewed Toxicity Value
RAO	Remedial Action Objective
RG	Remediation Goal
ROV	Remote-Operated Vehicle
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
ROD	Record of Decision
SF	slope factor
SSI	Screening Site Inspection
Site	Donna Reservoir and Canal System Superfund Site
TCEQ	Texas Commission on Environmental Quality
TDSHS	Texas Department of State Health Services
TRRP	Texas Risk Reduction Program
TNRCC	Texas Natural Resource Conservation Commission
T&E	Threatened and Endangered
TBC	To-Be Considered
TSCA	Toxic Substances Control Act
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

PART 1: THE DECLARATION

1.1 SITE NAME AND LOCATION

The Donna Reservoir and Canal System Superfund Site is located in Hidalgo County, Texas. The U.S. Environmental Protection Agency's (EPA) Superfund Database Identification Number for this Site is: TX0000605363.

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) describes the "Selected Remedy" for the Donna Reservoir and Canal System Superfund Site (hereinafter Site). The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S. Code §9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986; and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300, as amended (EPA 1990). This decision is based on the Administrative Record for the Site, which has been developed in accordance with Section 133(k) of CERCLA, 42 U.S. Code §9613(k). The locations of the information repositories and the Administrative Record file are presented in Section 2.3.3 (Information Repositories) of this ROD.

The State of Texas, represented by the Texas Commission on Environmental Quality (TCEQ), was provided the opportunity to review and comment on the EPA's Selected Remedy (i.e., Alternative 6 – Replace Siphon, Dredge Sediments, and Fish Removals).

1.3 ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

1.4 DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy is a final action for the Site. This Site is being addressed as a single operable unit and all the areas and media of concern within the Site are addressed in this ROD. The Selected Remedy addresses the Site-related human health risks associated with consumption of fish from the reservoir and canal system. It also addresses Site-related risks to ecological receptors from contaminated sediment.

The Selected Remedy includes the following major components:

- Removal of approximately 20,000 cubic yards of sediment exceeding the Cleanup Level of 0.043 milligrams/kilogram (mg/kg) Total Polychlorinated

Biphenyls (PCBs), located in the canal approximately 4,500 feet downstream of the Siphon's exit, and transportation to an off-site disposal facility;

- Replacement (i.e., construction of a new siphon) and abandonment of the existing Siphon (i.e., grouting in place);
- Removal of fish annually for five years from all sections of the Site (additional fish removals will be considered based on the attainment of the fish tissue Remediation Goal);
- Post remediation Site monitoring that includes:
  - Frequency of fish tissue monitoring and sediment sampling of the canal system will be determined during the remedial design of the Selected Remedy;
- Implementation of a public outreach program for ten years to inform the community of the potential health risks associated with consuming fish from the Site;
- Installation and maintenance of signs at the Site for ten years to warn people of the risks associated with consuming fish from the Site;
- Coordination with the Texas Department of State Health Services to maintain the Aquatic Life Order Number 9 until the fish tissue concentrations have reached the fish tissue Remediation Goal of 0.031 mg/kg Total PCBs;
- Implementation of an Institutional Control(s), in the form of a land-use restriction or notice as to the environmental conditions of the property, which will protect the integrity of the Selected Remedy, and evaluation of the appropriate Institutional Control(s) in consultation with the TCEQ; and
- Performance of statutory Five-Year Reviews to evaluate the performance of the Selected Remedy.

1.5 STATUTORY DETERMINATIONS

Pursuant to CERCLA Section 121 and the NCP; the EPA must select remedies that 1) are protective of human health and the environment; 2) comply with applicable or relevant and appropriate requirements (ARARs), unless a statutory waiver is justified; 3) are cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element of the remedy which permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants. The following section of this ROD discusses how the Selected Remedy meets these statutory requirements:

1) Protection of Human Health and the Environment: The Selected Remedy will protect human health and the environment by eliminating the contaminant transport pathway from the likely source (i.e., the Siphon) into the environment. The Selected Remedy will remove the sediment with the highest concentrations

of PCBs, manage short-term human health risks while fish tissue concentrations decrease with ICs, engineering controls, and a community involvement program. Specifically, the exposure of recreational fishers to PCBs in fish tissue will be reduced through the removal of contaminated sediment above the Cleanup Level and the removal of the fish from the reservoir and canal system. Ecological receptors of concern will be protected because they will no longer be exposed to PCBs in sediment at levels that result in unacceptable risk. Protection of human health and the environment is also discussed in Section 2.13.1 (Protection of Human Health and the Environment) of this ROD.

2) Compliance with ARARs: The Selected Remedy will be in compliance with all applicable ARARs. The NCP §§ 300.430(f)(5)(ii)(B) and (C) require that a ROD describe the federal and state ARARs that the Selected Remedy will attain or provide justification for any waivers. The implementation of the Selected Remedy generally will not require federal, state, or local permits for on-site response actions (40 CFR § 300.400[e][1]), but remedial actions must be completed in conformance with the substantive technical requirements of applicable permit regulations. ARARs for the Site are discussed further in Section 2.13.2 (Compliance with Applicable or Relevant and Appropriate Requirements) of this ROD.

3) Cost Effectiveness: The Selected Remedy is cost-effective and represents a reasonable value for the costs incurred. Section 300.430(f)(1)(ii)(D) of the NCP states that “A remedy shall be cost effective if its costs are proportional to its overall effectiveness.” The EPA evaluated the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., protection of human health and the environment and compliance with ARARs) by assessing three of the five balancing criteria in combination (i.e., long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The overall effectiveness of this remedial alternative was determined to be proportional to its costs and therefore the Selected Remedy (i.e., Alternative 6) represents a reasonable value for the money to be spent. The total estimated net present value cost to implement the Selected Remedy is $19.4 million.

4) Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable: The EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, the EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering State and community acceptance.

5) Preference for Treatment as a Principal Element: The NCP establishes the expectation that treatment will be used to address the principal threats posed by a site whenever practicable (40 CFR 300.430[a][1][iii][A]). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur.

   The likely source material at the Site is the existing Siphon and the contaminated sediment located downstream of the Siphon's exit. The Siphon and the contaminated sediment are not highly toxic or highly mobile. The Selected Remedy treats them as low-level threat waste and not principal threat waste. Because the source material at the Site is not principal threat waste, and because the ARARs do not require treatment, the Selected Remedy does not call for treatment of the source material. Sections 2.11 (Principal Threat Wastes) and 2.13.5 (Preference for Treatment as a Principal Element) of this ROD describe the results of the human health risk assessment and the chemical characteristics of PCBs which indicate the Site's source materials' low toxicity and mobility, respectively.

Because this remedy will result in hazardous substances remaining on the Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted pursuant to CERCLA Section 121(c), 42 U.S.C. § 9621(a), and 40 CFR § 300.430(f)(4)(ii) within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 DATA CERTIFICATION CHECKLIST

The following information is included in Part 2 (Decision Summary) of this ROD:

- Chemicals of concern (COCs) and their respective concentrations (Section 2.7.1 [Summary of the Human Health Risk Assessment]);
- Baseline risk represented by the COCs (Section 2.7 [Summary of Site Risks]);
- Remediation Goals, or Cleanup Levels, established for the COCs and the basis for these levels (Sections 2.8 [Remedial Action Objectives], 2.8.1 [Human Health Remediation Goal], and 2.8.2 [Ecological Preliminary Remediation Goal]);
- How there are no source materials constituting principal threats at the Site (Sections 1.5 [Statutory Determinations], 2.10.2 [Balancing Criteria, 2.11 [Principal Threat Wastes], and 2.13.5 [Preference for Treatment as a Principal Element]);

- Current and reasonably anticipated land use assumptions and current and potential future beneficial uses of surface water used in the baseline risk assessment and ROD (Sections 2.5.1 [Demographics and Cultural Features], 2.5.2 [Physical Characteristics], and 2.6 [Current and Potential Future Land and Resource Uses]);
- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy (Sections 2.5.1 [Demographics and Cultural Features], 2.5.2 [Physical Characteristics], and 2.6 [Current and Potential Future Land and Resource Uses]);
- Estimated capital; annual operation and maintenance; and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 2.9 [Description of Alternatives]); and
- Key factors that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Sections 2.10 [Comparative Analysis of Alternatives] and 2.12.1 [Summary of the Rationale for the Selected Remedy]).

Additional information can be found in the Administrative Record file for the Site. The locations of the information repositories and the Administrative Record file are included in Section 2.3.3 (Information Repositories) of this ROD.

1.7 AUTHORIZING SIGNATURE

This ROD documents the Selected Remedy for the Site. This remedy was selected by the EPA after consultation with the TCEQ. The Director of the Superfund Division (EPA, Region 6) has been delegated the authority to approve and sign this ROD.

By: _____ Date: 09/28/2018

Carl E. Edlund, P.E., Director
Superfund Division
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CONCURRENCE PAGE FOR RECORD OF DECISION

DONNA RESERVOIR AND CANAL SYSTEM SUPERFUND SITE

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PART 2: THE DECISION SUMMARY

This Decision Summary provides a description of the Site-specific factors and analyses that led to the Selected Remedy. It includes background information, a summary of the remedial investigation, the nature and extent of contamination, assessments of human health and ecological risks posed by the contaminants at the Site, the basis for action, and the identification and evaluation of remedial alternatives for the Site.

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

The Donna Reservoir and Canal System Superfund Site (hereinafter Site) is located in Hidalgo County, Texas (Figure 1 – Site Location), south of the City of Donna, near the United States border with Mexico. The City of Alamo is located northwest of the Site. The Site includes the approximately 400-acre Donna Reservoir (also known as Donna Lake, Val Verde Lake, Laguna Val Verde, and Laguna El Gato), a system of lateral lined and unlined canals and piping, and the Siphon. The Site extends north from the Rio Grande River approximately 17 miles with lateral canals that extend approximately 5.6 miles to the east and west. The reservoir system, canals, and the Siphon are operated by the Donna Irrigation District Hidalgo County Number One (hereinafter Irrigation District), which provides drinking water to the City of Donna, drinking water to the North Alamo Water Supply Corporation Plant No. 5, and irrigation water for the surrounding predominantly agricultural land. According to a report by the Texas Natural Resource and Conservation Commission (TNRCC), now the TCEQ, the remaining water that enters the reservoir and canal system and is not diverted for drinking water or irrigation purposes flows north of the Site into the Donna Drain and then east into the North Floodway (Figure 1 – Site Location).

The Irrigation District pumps surface water into the Site from the Rio Grande River through five pipes at a point approximately one mile downstream from Reynosa, Tamaulipas, Mexico. The volume and velocity of the water entering the canal system and eventually into the reservoirs can be controlled by the number of operational pumps. The water enters the Donna Main Canal and travels north by gravity flow for approximately two miles until it reaches the Siphon (Figure 2 – Site Layout). The Siphon is a 1,600-foot-long nine-foot inner diameter concrete pipeline which runs underneath the Arroyo Colorado River. After passing through the Siphon, water flow continues in an unlined earthen canal before it reaches a concrete-lined channel that conveys water north an additional 1.75 miles to the reservoir.

Donna Reservoir consists of a system of reservoirs that have an average depth of five feet and stores up to 390 million gallons of water. The reservoir system is made up of the East, West, and Northwest segments (Figure 2 – Site Layout). A lined canal flows directly into the West Reservoir where water flows freely into the East Reservoir through two conduits beneath South Valley View Road. This road divides the West and East Reservoir segments.

Sediment and fish found in the Donna Reservoir and the associated canals are contaminated with Polychlorinated Biphenyls (PCBs). PCBs are a group of man-made chlorinated hydrocarbons domestically manufactured from 1929 to 1979. The manufacture of PCBs was discontinued in the U.S. in 1977 because of the compounds' toxicity and persistence in the environment (EPA 2013). Aroclor is a trade name for a specific group of PCBs (e.g., Aroclor-1254 and Aroclor-1260, among others) and each Aroclor[1] is a mixture of several PCB Congeners. Other trade names for PCBs exist. A PCB Congener is any single unique chemical compound in the PCB category and there are a total of 209 PCB Congeners. Total PCBs as Aroclors and PCB Congeners were investigated at the Site. The highest concentrations of PCBs are found in the sediment immediately downstream of the Siphon's exit (Figure 2 – Site Layout). PCBs were also found in fish collected from all reaches of the system investigated. PCB Congeners were detected in all surface water samples collected; however, PCB Aroclors were only detected in one surface water sample which was collected near the Siphon's exit.

The likely source of PCB contamination at the Site has been determined to be the Siphon, based on the data collected during the Remedial Investigation and the weight of evidence. It is likely that the Siphon's construction/repair materials (e.g., concrete, caulking, grout, or sealants) were a primary source of contamination at the Site. The EPA could not locate specific records for the construction or the repair of the Siphon, other than the information provided by the Irrigation District. This information indicates that the Siphon was damaged by floodwaters in 1967, during Hurricane Beulah, and may have been repaired. Samples of the Siphon's construction materials were not collected by the EPA during the remedial investigation due to health and safety concerns, technical challenges, and high cost. Additionally, all options considered for the physical inspection of the interior of the Siphon introduced the potential to damage the structural integrity of the Siphon. The Siphon was constructed in approximately 1926 and is probably approaching the end of its design life. It is possible that the concrete and steel used to construct the Siphon may have degraded over time and any direct physical efforts to sample the Siphon could damage the Siphon.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section of the ROD provides background information on the construction of the reservoir and canal system, federal and state investigations, and cleanup actions conducted pursuant to CERCLA.

2.2.1 *Donna Reservoir and Canal System Construction History*

Construction of the canal system began in 1906 starting with the Rio Grande Pump Station. This pump station was soon expanded to include a set of five diesel pump engines that lift water through pipes from the Rio Grande River into the Main Canal (Figure 2 – Site Layout). The Northwest Reservoir was placed into service in 1913 with

[1] This document identifies PCB concentrations as PCBs measured as individual Aroclors (e.g., Aroclor-1254, Aroclor-1260), as the sum of PCB Congeners (i.e., Total PCB Congeners), or as Total PCBs, which is either the sum of PCB Aroclors or the sum of PCB Congeners.

the construction of Re-Lift Pumping Plant No. 3 located on the northern side of the reservoir system. The Siphon was constructed approximately in 1926 and replaced the original elevated concrete canal that stretched above the Arroyo Colorado River on concrete pillars. The West Reservoir of the reservoir system was placed into service in 1955 (TNRCC 2001).

A new section of the canal and the East Reservoir were constructed in 1963 through 1964. The new concrete-lined channel (i.e., Lower West Main Canal Lined) was constructed east of the previous earthen canal that ran along the western boundary of the Donna Irrigation District. Once the Lower West Main Canal Lined was placed into service, the canal it replaced was abandoned and filled. The East Reservoir was connected to the West Reservoir by conduits underneath South Valley View Road. The Siphon was damaged by floodwaters in 1967, during Hurricane Beulah, and may have been repaired.

The Irrigation District performs periodic maintenance of the earthen canals (i.e., dredging/excavation of sediment) as the need arises. Periodic maintenance includes removal of soft sediment and material that accumulates on the bottom of the canals. Material is mechanically removed from the canals and placed on the canal levee banks. The Irrigation District performed maintenance in 1990 and 1991 at the Lower West Main Canal Unlined from the Siphon's exit to the Lower West Main Canal Lined. Other maintenance operations may have subsequently occurred as needed during the operation of the reservoir and canal system. According to the Irrigation District, additional maintenance of the reservoir and canal system may also be needed in the future. This maintenance is required to maintain reservoir and canal capacity and flow.

2.2.2 *Federal and State Investigations*

A series of federal and state investigations and studies were performed by numerous agencies throughout the Lower Rio Grande Valley prior to the start of the Remedial Investigation and Feasibility Study by the EPA in September 2012. Additional information regarding these investigations and studies can be found in the Remedial Investigation Report (Revision 01) (EA Engineering, Science, and Technology, Inc., PBC [EA] 2016a). This section of the ROD provides a summary of these investigations and studies.

Lower Rio Grande Valley Environmental Study of 1992

The Donna Irrigation District reservoir and canal system became an area of interest during the implementation of the Lower Rio Grande Valley Environmental Study (LRGVES) of 1992. The "Interagency Coordinating Committee for United States/Mexico Border Environmental Health" initiated the LRGVES in response to the elevated rate of infants born with neural tube defects in Cameron County in 1991. The study evaluated contaminant exposure of nine families residing in Cameron and Hidalgo Counties (TNRCC 1998). The study of one of the families revealed that the concentration of PCBs in a common carp intended for human consumption was 399 parts per million (ppm). This carp was reportedly caught in one of the main canals of the Donna Irrigation

District reservoir and canal system. Blood samples from the residents in possession of the fish also had elevated concentrations of PCBs (EPA 1994, TNRCC 2001).

The Texas Department of Health and the TNRCC conducted extensive sampling throughout Hidalgo County and along the Rio Grande River from El Paso to Brownsville following the results of the LRGVES. Elevated concentrations of PCBs in fish fillets collected from the Donna Reservoirs, Donna Main Canal, and the Arroyo Colorado River were found, while fish from other waters studied did not reveal elevated concentrations (TNRCC 2001).

U.S. Geological Survey Suspended Sediment Evaluation

The U.S. Geological Survey (USGS) conducted suspended sediment sampling events in the canal system between 1999 and 2001. The results of this investigation revealed PCB-contaminated sediment and identified a 35-meter-long PCB concentration area of the canal system just north of the Siphon's exit in the Lower West Main Canal Unlined, on the right bank, as a possible source area (USGS 2002).

Texas Natural Resource Conservation Commission Screening Site Inspection Report

The TNRCC's Superfund Site Discovery and Assessment Program, in coordination with the EPA (Region 6), prepared a Screening Site Inspection (SSI) Report for the Site in November 2001. The investigation included collecting samples, summarizing historical Site data, and documenting observations of potential hazardous materials releases. Analytical results from the SSI sampling events, conducted on April 9 through April 13, 2001, revealed elevated concentrations of PCB Aroclor-1254 in suspended sediment samples. Concentrations ranged from 15.0 to 53.0 micrograms per kilogram (µg/kg) in suspended sediment over an approximate 5.75-mile distance within the Site. PCBs were not detected in soil, surface water, or bed sediment samples collected during the SSI. The SSI Report concluded that concentrations of the hazardous substance PCB Aroclor-1254 met the observed release criteria and the source was listed as suspended sediment (TNRCC 2001).

Texas Department of State Health Services Sampling and Visits to Restaurants

The results of the 2005 fish tissue collection by Texas Department of State and Health Services (TDSHS) indicated that PCBs were present in most of the thirty fish collected from the Main Canal, Lower West Main Canal Unlined, Lower West Main Canal Lined, and Donna Reservoir at concentrations ranging from below detection limits (less than 0.005 µg/kg) to 2,700 µg/kg. The TDSHS concluded their 2005 report by stating that "consumption of any of the . . . fish species from the DIS [Donna Irrigation System] . . . continues to pose an apparent hazard to human health."

The EPA received information in March 2013 that a vendor was possibly selling fish from Donna Lake to local restaurants. The EPA provided this information to the TDSHS and, based on this information, the "Health Assessment and Toxicology Program" of the

TDSHS visited approximately 60 restaurants in the Donna and Alamo, Texas, areas in June 3 through 5, 2013. The TDSHS informed the restaurant owners and managers of the fish contamination at the Site and stated that it is illegal to possess fish from the Site and to purchase and serve those fish. The TDSHS also distributed educational materials to the restaurants and the Hidalgo County Health Department during the June 2013 visits.

Texas Commission on Environmental Quality Feasibility Study

A 2006 Feasibility Study, conducted by the TCEQ, focused only on the area previously identified as contaminated with PCBs in the Lower West Main Canal Unlined from the Siphon's exit to the 90-degree bend in the unlined canal. This study evaluated two alternatives[2]: 1) Alternative 1 – Lining of Siphon and Canal, and 2) Alternative 2 – Construction of New Siphon and Canal (URS Corporation 2006).

Alternative 1 (Lining of Siphon and Canal), from the TCEQ's Feasibility Study, involved lining the main canal and the Siphon with a suitable material which would prevent the bed sediment or other potential sources in the canal from contacting the conveyed waters. This alternative included sliplining of the existing Siphon.

Alternative 2 (Construction of New Siphon and Canal), from the TCEQ's Feasibility Study, involved the construction of a siphon and canal from the entrance of the existing Siphon to the 90-degree bend in the Main Canal. This alternative would require the purchase of a strip of land along the existing canal, if not already available, and depending on the chosen alignment of the new siphon and canal. The new canal would be lined since the source area of the PCBs was unknown at the time of the 2006 study.

Since the TCEQ was unable to identify a source of PCB contamination, the State of Texas referred the site to the EPA for further investigation. The EPA received a letter from the Governor of Texas on July 26, 2007, stating that Texas supported the EPA's decision that the Donna Reservoir and Canal System site be considered as a candidate for the Federal National Priorities List for cleanup.

Agency for Toxic Substances and Disease Registry Public Health Assessment

The Agency for Toxic Substances and Disease Registry (ATSDR) released the Public Health Assessment (PHA) for the Site for public comment in January 2009. The final version was released in November 2010 by the TDSHS in conjunction with the ATSDR. The final report concluded that the consumption of fish from the Site was harmful to human health due to the PCB concentrations found in the fish. The final report also concluded that the concentrations of metals, volatile organic compounds, semi-volatile

[2] These alternatives are not the same alternatives described in the EPA's Proposed Plan (May 2018) or this Record of Decision.

organic compounds, or organochlorine pesticides detected in fish from the Site are not expected to pose harm to human health.

2.2.3 *Texas Department of Health Aquatic Life Order Number 9*

The Texas Department of Health (TDH) issued "Aquatic Life Order Number 9" on February 4, 1994. This order stated that ". . . the Donna Irrigation System located in Hidalgo County is declared a prohibited area for the taking of all species of aquatic life." According to a sign posted by the TDH at Donna Lake there is a $500 fine for the possession of fish from the Site. This sign also states that "Warning, it is illegal to possess fish from this water, fish caught from this water may contain harmful chemicals." The enforcement authority for this order is the Texas Parks and Wildlife Department (TPWD).

2.2.4 *National Priorities List*

The Site was listed on the National Priorities List (NPL) in March 2008 due to PCB contamination in sediment and fish (EPA 2008).

2.2.5 *EPA's Remedial Investigation*

The EPA began a Remedial Investigation at the Site in September 2012 and ended the field investigation activities in April 2015. The purpose of the Remedial Investigation (RI) and Feasibility Study (FS) was to determine the nature and extent of contamination at the Site, develop the Human Health and Ecological Risk Assessments, and evaluate the applicable remedial alternatives to address the contamination at the Site.

More than 80,000 analyses were conducted for more than 480 analytes on samples collected during the RI to characterize the chemical and physical characteristics of the Site. Samples were analyzed for a combination of the following: PCB Aroclors, PCB Congeners, pesticides, volatile organic compounds, semi-volatile organic compounds, total target analyte list (TAL) metals, dissolved TAL metals, total organic carbon, total dissolved solids, total suspended solids, lipids, percent moisture, and passive sampler samples (semi-permeable membrane device and polyoxymethylene). The specific media investigated during the RI included soil, bed/suspended sediment, surface water, ground water, whole fish, fish fillets, mollusk tissue, and concrete debris and asphalt (both found in the Lower West Main Canal Unlined segment of the canal system near the Siphon's exit). The following table provides the number of sample locations according to media type.

Number of Sample Locations According to Media Type

Media	Soil	Sediment	Suspended Sediment	Surface Water	Ground Water	Mollusk
Number of Sample Locations	53	137	20	48	2	23
Media	**Whole Fish**	**Fish Fillets**	**SPMD**	**POM**	**Concrete**	**Asphalt**
Number of Sample Locations	10	82	14	10	2	1
Note: POM – Polyoxymethylene SPMD – Semi-permeable membrane device						

The nature and extent of contamination determined during the RI is presented in Section 2.5.4 (Nature and Extent of Contamination) of this ROD.

EPA's Phased Remedial Investigation

The EPA completed thirteen phases of field work. The EPA notified local public officials of the planned RI and fish removal action activities prior to each mobilization to the field. The EPA also notified the print and television media and conducted interviews in English and Spanish to inform the public of the EPA's activities at the Site and to warn against consumption of contaminated fish.

Remedial Investigation Phases One through Thirteen

Phase One RI field activities were conducted from September 17 through 28, 2012, and included the collection of sediment, surface water, suspended sediment, soil, and air samples from several areas of the Site, including the Rio Grande River. Sediment and water samples were also collected from the City of Donna Drinking Water Treatment Plant as requested by city officials during a community meeting.

Phase Two field activities were conducted from October 15 through 25, 2012. This phase of the RI included the fourth fish removal action, fish sample collection, and the performance of a land-based geophysical survey. The purpose of the survey was to detect the presence of metallic objects (i.e., buried drums or transformers) possibly containing PCBs. During the investigation several local residents informed the EPA of their observation of the presence of metallic receptacles at the Site. This survey covered approximately 33 acres of land areas adjacent to the banks of the Site's canals and the Arroyo Colorado River.

Phase Three field activities were conducted from December 10 through 15, 2012, and included a water-based geophysical survey among other sample collection efforts. This survey was also designed to locate metallic objects and covered approximately 18 acres submerged under water in the Site's canals.

Phases Four through Thirteen began on February 18, 2013, and ended on April 10, 2015, respectively. Among other sample collection efforts, the EPA's "Environmental Response Team/Scientific Engineering and Response and Analytical Services Contract Dive Team" used side-scan sonar to scan the Lower West Main Canal Unlined and East Reservoir to locate underwater objects. Selected objects were then physically examined by members of the EPA's Region 6 Dive Team. Discrete surface water samples were collected at the Siphon's entrance; the interior of the Siphon at approximately 150, 350, 550, 750, 950, 1150, 1350, and 1550 feet from the Siphon's entrance; and at the Siphon's exit (Figure 3 – Existing Siphon Plan, Profile, and Sections; and Figure 19 – Total Polychlorinated Biphenyl Congeners in Surface Water Samples Collected from Inside the Siphon). An inspection of the interior of the Siphon was performed using a Remotely Operated Vehicle (ROV). The ROV which was outfitted with scanning sonar, multi-beam imaging sonar, and a video camera was used to inspect the entire length of the interior of the Siphon.

The nature and extent of contamination is described in Section 2.5.4 (Nature and Extent of Contamination) of this ROD.

2.2.6 *CERCLA Fish Removal Actions*

The EPA conducted fish removal actions in August 2008, February 2009, August 2009, October 2012, June 2017, and August 2018. In accordance with CERCLA Section 104(a), 42 U.S.C. § 9604(a), and 40 CFR 300.415 of the NCP, these removal actions were conducted to address actual or threatened releases of hazardous substances, pollutants, or contaminants from the Site that may present an imminent and substantial endangerment to the public health, welfare, or the environment.

These fish removal actions involved the removal of several species of fish from the Site (i.e., alligator gar, freshwater drum, common carp, smallmouth buffalo, channel catfish, large/smallmouth bass, white bass, blue tilapia, shad, and eel, among other species). The purpose of the fish removal actions was to remove fish, from the reservoir and canal system, possibly contaminated with PCBs and which were available for human consumption. The EPA implemented these removal actions along with a public awareness campaign using newspaper and television media to warn against consumption of PCB-contaminated fish that may be harmful to human health.

These fish removal actions, coordinated with the U.S. Fish and Wildlife Service (USFWS), utilized electroshocking methods. An electrical current was introduced into the water column which resulted in stunning or disorienting the fish. During the time when the fish were disoriented they were netted by boat personnel. Approximately 44,863 fish were removed from the Site during the six fish removal actions and disposed of at an appropriate landfill. Selected whole fish and fillet samples were analyzed in a laboratory for bioaccumulated concentrations of Total PCBs.

2.3 COMMUNITY PARTICIPATION

This section of the ROD describes the EPA's community involvement and participation activities. The EPA has been actively engaged with stakeholders and has encouraged community participation during the EPA's remedial and removal activities. These community participation activities during the remedy selection process meet the public participation requirements in CERCLA 300.430(f)(3) and the NCP.

The EPA periodically met with local, county, and state/federal public officials (i.e., Mayors and City Managers for the Cities of Donna and Alamo, Hidalgo County representatives, Texas Secretary of State representatives, TCEQ, USFWS, International Boundary and Water Commission [IBWC], and other public officials), including several community-based organizations (i.e., non-governmental organizations or others) and representatives from the Irrigation District during the implementation of the RI and fish removal actions. These meetings helped the EPA become better aware of the issues and concerns held by the local officials and the public.

2.3.1 *Community Involvement Plan*

The Community Involvement Plan (CIP, [EPA 2016]) is central to Superfund's community involvement program. The EPA developed this CIP to facilitate two-way communication between the community surrounding the Site and the EPA, and to encourage community involvement in Site activities. The EPA will utilize the community involvement activities outlined in this plan to ensure that residents are continuously informed and provided opportunities to be involved. This plan specifies the outreach activities that the EPA undertakes to address the community's concerns and expectations.

The CIP includes background information concerning the community, identification of community issues and concerns, community involvement activities, a communication strategy, a contact listing of city/county/state/federal officials, and local print and television media contacts.

2.3.2 *Community/Public Meetings and Fact Sheets*

The EPA has conducted community meetings during the course of the Superfund process. In addition, fact sheets detailing the Site's activities have been published periodically since the Site was listed on the NPL.

The public meetings announcing the Proposed Plan were held on May 22, 2018, in Alamo and Donna, Texas. The Proposed Plan described the EPA's rationale for the selection of the Preferred Alternative. A public comment period for the Proposed Plan was held from May 7 through June 5, 2018. Public notices of the public meeting and public comment period were published in two newspapers of general circulation, in English and Spanish. Additionally, the public notice announcing the Proposed Plan, public meeting, and comment period was mailed to the contacts included in the Site's mailing list. Representatives from the EPA provided presentations on the Proposed Plan

and answered questions about the EPA's Preferred Alternative. Representatives from the TCEQ and the Texas Department of State Health Services were also present at the meeting. Oral and written comments were accepted at the meeting and a court reporter transcribed the discussions held during the meeting. This transcript is included in the Administrative Record file for the Site. The EPA's responses to each of the comments received during the public comment period are included in Part 3 (Responsiveness Summary) of this ROD.

2.3.3 *Information Repositories*

The Administrative Record file for the Site is available for review at the following locations:

Donna Public Library
301 S. Main
Donna, Texas 78537
(956) 464-2221

U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue, 7th Floor
Dallas, Texas 75202-2733
Contact: Edward Mekeel, (214) 665-2252 or (800) 533-3508
E-mail: mekeel.edward@epa.gov

Texas Commission on Environmental Quality
Building E, Records Management, First Floor
12100 Park 35 Circle
Austin, Texas 78753
(512) 239-2920 or (800) 633-9363

The Administrative Record file, along with the Site's profile page, is also available on the internet at the following EPA's website:

http://epa.gov/superfund/donna-reservoir-canal

2.4 SCOPE AND ROLE OF RESPONSE ACTION

The NCP, 40 CFR Section 300.5, defines an "Operable Unit" (OU) as a discrete action that comprises an incremental step toward comprehensively addressing a site's contamination problems. The cleanup/remediation of a site can be divided into several OUs depending on the complexity of the problems associated with the site.

There is only one planned OU for the Site and the EPA's Selected Remedy (i.e., Alternative 6) is intended to fully address the threats to human health and the environment posed by the conditions at the Site by addressing the existing Siphon and contaminated sediments, and by the implementation of fish removals and performance

monitoring. It is possible that multiple OUs may be considered during the remedial design of the Selected Remedy to facilitate the implementation of the Selected Remedy.

2.5 SITE CHARACTERISTICS

The following sections of the ROD describe the Site's demographics and cultural features, physical characteristics, Conceptual Site Model, and the nature and extent of contamination identified during the RI.

2.5.1 *Demographics and Cultural Features*

According to the 2010 Census (U.S. Census Bureau 2010a), the total population of Donna, Texas, was 15,798. There were a total of 4,613 households with an average size of 3.42 and the population was 92.3 percent Hispanic or Latino. Median per capita income in 2000 was $8,569, while the mean household income was $22,800 (U.S. Census Bureau 2000).

According to the 2010 Census (U.S. Census Bureau 2010b), the total population of Alamo, Texas, was 18,353. There were a total of 5,603 households with an average size of 3.27 and the population was 84.6 percent Hispanic or Latino. Median household income was $35,188 (U.S. Census Bureau 2010-2014 American Community Survey 5-Year Estimates).

The greater metropolitan area to which the cities of Donna and Alamo belong is the McAllen-Edinburg-Mission metropolitan area. The total population of this metropolitan area in 2010 was 774,769. There were 216,471 total households with an average size of 3.55 and 90.6 percent of the population were identified as "Hispanic" or "Latino." Per capita income in 2010 was estimated at $13,525 while the mean household income was estimated to be $47,576. The U.S. Census Bureau also estimated that 29 percent of families and 33.4 percent of people in the metropolitan area have an income below the poverty level. The 2000 Census data indicated that 80 percent of the population speaks non-English at home and that 39 percent speak English "not well," "not at all," or "less than well."

Hispanic communities known as "colonias" are common along the Rio Grande River, where they exist often without basic services such as access to adequate water, sewage, housing, and health services. The Texas Department of Housing and Community Affairs characterizes these communities as low income and high unemployment areas. Five such colonias have been identified immediately south of Donna (Texas Secretary of State 2011).

2.5.2 *Physical Characteristics*

This section of the ROD describes the following physical characteristics of the Site: plant species and wildlife, ground water, surface water, sediment, and soils.

Plant Species and Wildlife

Most of the native vegetation of the Lower Rio Grande Valley has been cleared for agriculture (MacWhorter 2015). Where native habitat remains in Hidalgo County, it contains vegetative communities unique to the Lower Rio Grande Valley. The area is characterized by a semi-arid and subtropical climate (Jahrsdoerfer and Leslie 1988) and includes mid-delta thorn forest, which once covered most of the Rio Grande Delta. Today, less than 5 percent of this plant community remains in the area. The small remnant tracts can be found in fence rows, highway rights-of-way, canals, and ditch banks (Jahrsdoerfer and Leslie 1988).

Plant species in the area around the Site are expected to include agricultural crops and small stands of shrubs and low trees. Wildlife in these terrestrial habitats is expected to include birds, mammals, reptiles, and amphibians typical of the South Texas Plains. It is also expected that livestock will utilize the terrestrial habitats irrigated by the canals. The land use in the area is primarily agricultural; therefore, wildlife would also include species habituated to man-made environments such as the reservoir and canal system comprising the Site. Based on field observation, the banks of the reservoir and canal system are dominated by giant reed, including riprap, and are unlikely to provide substantial habitat preferred by most species. The outer banks of the reservoir and canal system are dominated by agricultural fields.

The following types of fish were removed from the Site during the 2012 fish removal action and are common in the reservoir and canal system: common carp, grass carp, gizzard shad, threadfin shad, buffalo, freshwater drum, redear sunfish, redbreast sunfish, bluegill, warmouth, largemouth bass, smallmouth bass, white crappie, Rio Grande cichlid, blue tilapia, channel catfish, blue catfish, white bass, longnose gar, alligator gar, spotted gar, Mexican tetra, bigmouth sleeper, plecostomus, and silvers love (Dynamac Corporation 2013).

Birds expected at the Site include common species such as redwing blackbird, green jay, and red-tailed hawk that utilize the riparian corridor, as well as water birds such as great blue heron that utilize the waterways and reservoir. It is anticipated that the Site is used by both full-year resident and migratory birds. Mammals likely include raccoon, red fox, rodents, and shrews. Reptiles may include a variety of snakes and turtles that utilize the waterways. Amphibians may include the leopard frog and Mexican burrowing toad.

Several threatened and endangered (T&E) species were evaluated during the ecological risk assessment. These T&E species included the Coues' rice rat, interior least tern, reddish egret, false spike mussel, Salina mucket, and Texas hornshell. Some or all of these species may or may not be present at the Site because of limited habitat. According to the TPWD the Coues' rice rat prefers habitat in cattail-bulrush marshes and aquatic grassy zones near oxbow lakes. From aerial photographs the Northwest Reservoir appears to be the remnants of an oxbow lake; however, this portion of the reservoir system comprises a relatively small area in comparison to the entire reservoir and canal system. The canals are not a suitable habitat for this T&E species.

Ground Water

Hidalgo County relies primarily on surface water from the Rio Grande River, which provides approximately 98 percent of water used in the Lower Rio Grande Valley (McCoy 1990). As such, ground water is not the primary source of water near the Site. The Evangeline and Chicot aquifers do yield moderate to large quantities of fresh to moderately saline water in Hidalgo County (McCoy 1990); however, some of this water is not suitable for irrigation or drinking water purposes (McCoy 1990). It is anticipated that future ground water use will remain the same as current ground water use in Hidalgo County, which has only limited use as a source of irrigation water, domestic water, and municipal water.

The depth to ground water measured in the two monitoring wells installed in the canal levee during the RI, near the Siphon's exit, was approximately 27 feet below the ground's surface. The depth to water relative to the agricultural fields is approximately 7 feet below the ground's surface, assuming the levee is approximately 20 feet above the surrounding agricultural fields.

Surface Water

The surface water for the entire reservoir and canal system is a freshwater system fed from the Rio Grande River. The volume and velocity of the water entering the system and thus the reservoir can be controlled by the number of operational pumps. The canals and Siphon have been designed to transport water at a maximum flow rate of 400 cubic feet/second (cfs) measured at the Rio Grande River pumping station operated by the Irrigation District. The flow rate which is variable throughout the year and directly corresponds to the agricultural and municipal demand usually varies between 40 to 300 cfs during the year. Thus, variable pumping rates correspond to variable water levels in the canal system, ranging from a foot or less in some places during periods of low agricultural water demands (e.g., rainy cold seasons) to over 15 feet in others during periods of high agricultural water demands (e.g., dry summers). The water depth in the reservoirs varies from 1 to 3 feet. The surface water has high conductivity (salinity), during periods of drought, and some estuarine fish species have been found during the fish removal actions. It is anticipated that future surface water use will remain the same as current surface water use in Hidalgo County, which has significant use as a source of irrigation water and municipal water.

Sediment

The unlined reservoirs and canals have the thickest sediment, up to a maximum recorded thickness of 20 inches in the Lower West Main Canal Unlined near the Siphon's exit. The lined canals tend to have very limited to no sediment deposition. Sediment within the system is primarily fine grained and consisting of silt and clay with minor amounts of fine sand which is light gray to dark gray in color.

Soils

The Site's soils are identified as groups of clay, silty clay, and clayey loam within the U.S. Department of Agriculture Classification System. Clay content ranges from 22 to 64 percent, silt content ranges from 30 to 46 percent, sand content ranges from 1 to 35 percent (most samples are below 5 percent), and gravel content ranges from 0 to 14 percent. The dominant soil type extending from the Rio Grande River to the City of Donna is Harlingen Clay, which is a deep nearly level soil primarily composed of calcareous clay. Harlingen Clay is moderately well drained, surface runoff is very slow, permeability is very low, and available water capacity is low (U.S. Department of Agriculture 1981). It is anticipated that future uses of the soils will remain the same as current soils use in Hidalgo County, which have significant use as an agricultural resource.

2.5.3 *Conceptual Site Model*

A Conceptual Site Model (CSM) identifies the sources of contamination, release mechanisms, pathways for contaminant transport, the impacted media, and potential human and ecological receptors. The CSM is used to organize and communicate information about a site and is the basis for the remedial action presented in this ROD.

Separate CSMs have been developed for human and ecological receptors. The CSMs, in tabular format, for human health and ecological receptors are depicted in Figure 22 (Human Health Conceptual Site Model) and Figure 24 (Ecological Conceptual Site Model), respectively. A CSM, in graphical format, is depicted in Figure 27 (Pictorial Conceptual Site Model). Based on the human health and ecological risk assessments, complete pathways for contaminant transport were identified for both human and ecological receptors to fish tissue and sediment, respectively, as depicted in the tabular and graphical CSMs for human and ecological receptors.

The Site includes a system of reservoirs and canals containing fish and sediment with elevated concentrations of PCBs. Fish with detectable levels of Aroclor-1254, Aroclor-1260, or PCB Congeners have been collected from several segments of the reservoir and canal system sampled as described in Section 2.5.4 (Nature and Extent of Contamination). Sediment concentrations for Total PCB Aroclors and Total PCB Congeners decrease with distance in the Lower West Main Canal Unlined from the Siphon's exit to results reported below detection levels further downgradient of the Siphon's exit as shown in Figures 4 (Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment) through 17 (Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment). From the information gathered during the RI, it may be concluded that PCBs are bioaccumulating in fish, and the largest known accessible source of PCBs at the Site for fish is the sediment in the canal system.

The likely source of PCB contamination at the Site has been determined to be the Siphon, based on the data collected during the RI and the weight of evidence. It is likely that the Siphon's construction/repair materials (e.g., concrete, caulking, grout, or sealants) were a primary source of contamination at the Site.

Sediment data collected during the RI initially suggested the following options for the location of the source of PCB contamination:

1) Between the Siphon's exit and the 90-degree bend in the Lower West Main Canal Unlined in the area with the most elevated concentrations of PCBs in sediment,
2) Immediately upgradient of the Siphon's exit and downgradient of the Main Canal (i.e., in the 160-feet concrete-lined section between the weir and the Siphon's exit), or
3) No longer present at the Site.

Based on the following results of the RI, Option 2, excluding the 160 feet of concrete-lined section between the weir and the Siphon's entrance, may be the likely source of contamination.

Land- and water-based geophysical surveys were conducted in the Lower West Main Canal Unlined to identify objects requiring assessment as potential sources of PCBs. These targets were investigated during a scientific diver survey. The scientific divers found no indication of PCB-laden objects in the canal, which eliminates a possible source in the Lower West Main Canal Unlined. Surface water samples collected from within the Siphon and passive samples collected downgradient of the Siphon's exit indicate that a likely continuing source of PCB contamination exists at the Site (Figures 19 through 21). The remote-operated vehicle underwater sonar and camera inspection of the Siphon indicates that no foreign objects (e.g., transformers, drums) are located within the interior of the Siphon.

The hydraulics of the Siphon indicate that much, if not all, of the time a positive pressure is exerted from the interior of the Siphon. This means that water is forced out of cracks or leaking joints in the Siphon and the chances of contamination leaking into the Siphon are low. Therefore, by weight of evidence from the field investigations, the likely primary source of PCBs is located within the Siphon and is not a foreign object (e.g., transformer).

It is possible that Siphon construction or repair materials (e.g., concrete, caulking, grout, or sealants) were the primary source of contamination at the Site. PCBs were domestically manufactured from 1929 to 1979 and used for a variety of purposes (EPA 2013). PCBs were used in capacitors, transformers, caulking, surface coatings, and pesticide extenders, among other uses. The EPA could not locate any information to indicate that PCBs were historically used as pesticide extenders in the surrounding agricultural fields. Records for the construction of the Siphon could not be located and samples from the Siphon's construction or repair materials were not collected during the RI because the Siphon is in continuous use. Technical challenges, health and safety concerns, and high cost associated with a Siphon in continuous use (i.e., always full of water) resulted in the decision to not attempt Siphon construction or repair material sample collection. The Siphon was constructed in approximately 1926 and is probably approaching the end of its design life. It is possible that the concrete and steel used to

construct the Siphon may have degraded over time and any direct physical efforts to sample the Siphon could damage the Siphon.

As depicted in the graphical CSM shown in Figure 27 (Pictorial Conceptual Site Model), PCBs enter the canal system by leaching into surface water during flow through the Siphon. PCBs are hydrophobic and adhere to particles in the surface water. The rapid decrease in surface water velocity as water exits the Siphon results in the deposition of particulates that have adsorbed the PCBs, resulting in a gradient of decreasing PCB sediment concentrations with distance from the Siphon's exit. Fish and other aquatic organisms bioaccumulate and biomagnify PCBs over time and then these fish are available for human consumption.

2.5.4 Nature and Extent of Contamination

The nature and extent of contamination at the Site was determined during the RI. The likely source of PCB contamination at the Site has been determined to be the Siphon, based on an evaluation of the data collected during the RI and weight of evidence.

Total PCB Aroclors and Total PCB Congeners (i.e., 209 Congeners) were investigated at the Site. Fish with detectable levels of Aroclor-1254 or Aroclor-1260 have been collected from all segments of the canal and reservoir system sampled (i.e., Main Canal, Lower West Main Canal, and West Reservoir). The maximum detected concentration of Total PCB Aroclors in fish tissue is 8.1 mg/kg found in a sample of smallmouth buffalo, a bottom feeder, from the Lower West Main Canal Unlined near the Siphon's exit (see "Sample BUF-153-F" [2015 Area 3] on Figure 18 – Fish Concentrations of Aroclor-1254, Aroclor-1260, and Total Polychlorinated Biphenyl Congeners). The maximum detected concentration of Total PCB Congeners in fish tissue is 150 mg/kg also found in a smallmouth buffalo caught in the Lower West Main Canal Unlined near the Siphon's exit (see "Sample BUF-170-F" [2015 Area 4] on Figure 18).

Maximum detected Total PCB Congener concentrations observed in fish are approximately 25 times higher than those observed in sediment (150 mg/kg in fish to 6.1 mg/kg in sediment). Maximum detected Total PCB Aroclor concentrations observed in fish are very similar to those observed in sediment (8.1 mg/kg in fish to 11 mg/kg in sediment). Average detected Total PCB Congener concentrations observed in fish are approximately 20 times higher than those observed in average detected sediment concentrations (7.2 mg/kg in fish to 0.41 mg/kg in sediment). Average detected Total PCB Aroclor concentrations observed in fish are approximately 3 times higher than those observed in average detected sediment concentrations (0.6 mg/kg in fish to 0.24 mg/kg in sediment). These data support the conclusion that PCBs are bioaccumulating in fish.

Sediment with the highest concentrations of PCBs at the Site is in the Lower West Main Canal Unlined which is located hydraulically downgradient of the Siphon's exit (Figure 8 – Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment, Figure 9 – Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment, and Figure

25 – Sediment Remediation Area Based on a Sediment Cleanup Goal of 0.043 mg/kg). The highest observed concentration of Total PCB Aroclors in sediment is 11 mg/kg, collected near the Siphon's exit, which was reported entirely as Aroclor-1254 (see "Sample LWCU-160-SE" [2013] on Figure 8). The highest observed concentration of Total PCB Congeners in sediment is 6.1 mg/kg, also collected near the Siphon's exit (see "Sample LWMCU-160-SE" [2013] on Figure 9). Sediment concentrations of Total PCB Aroclors and Total PCB Congeners decrease with distance in the Lower West Main Canal Unlined from the Siphon's exit to results reported below detection levels hydraulically downstream of the exit.

Passive sampler data, from semi-permeable membrane devices and polyoxymethylene (POM) samplers, indicate that fish may receive PCBs from the water column directly or from prey or sediment they ingest. However, the largest known PCB source at the Site directly accessible to fish is sediment in the canal system. POM sampler concentrations of Total PCB Congeners in both surface water and sediment pore water generally decrease with distance from the Siphon's exit also indicating that the PCBs are likely sourced from the Siphon.

Discrete surface water samples collected from the entrance, at multiple points from the interior, and at the exit of the Siphon indicate a general increase in concentrations of Total PCB Congeners along the interior length of the Siphon (Figure 3 – Existing Siphon Plan, Profile, and Sections; and Figure 19 – Total Polychlorinated Biphenyl Congeners in Surface Water Samples Collected from Inside the Siphon). The increase in Total PCB Congeners surface water concentrations along the length of the Siphon suggests that the likely source is not a single point but is present along the entire length of the Siphon. PCBs enter the canal system by leaching into surface water during flow through the Siphon. PCBs are hydrophobic and adhere to particles in the surface water and sediment. The rapid decrease in surface water velocity as water exits the Siphon results in deposition of particulates that have adsorbed PCBs which resulted in a gradient of decreasing PCB sediment concentrations with distance from the Siphon's exit. Fish and other aquatic organisms have bioaccumulated and biomagnified PCBs through the food chain over a period of decades.

The water-based geophysical survey and side-scan sonar results provided targets for further investigation by the EPA's scientific divers in the Lower West Main Canal Unlined. The scientific divers found no indication of PCB-laden objects (e.g., transformers or drums) in the canal which eliminates a possible source in the Lower West Main Canal Unlined. The land-based geophysical survey also found no indication of PCB-laden objects beneath the surface of the ground along the banks/levees of the canals.

The ROV inspection of the Siphon indicates that no foreign objects (e.g., transformers or drums) are located within the interior of the Siphon. The hydraulics of the Siphon indicate that for most of the time a positive pressure is exerted from the interior of the Siphon. This means that water is forced out of cracks or leaking joints in the Siphon, and the chances of contamination leaking into the Siphon are low. Therefore, the

available data and evidence indicate that the primary likely source of PCBs is located within the Siphon and is not a foreign object.

It is possible that Siphon construction/repair materials (e.g., concrete, caulking, grout, or sealants) were the primary source of contamination at the Site. PCBs were domestically manufactured and used for a variety of purposes from approximately 1929 to 1979. The information recently provided by the Irrigation District indicates that the Siphon was damaged by floodwaters in 1967, during Hurricane Beulah, and may have been repaired. Samples of the Siphon materials (e.g., concrete, caulk, grout, or sealants) were not collected by the EPA during the RI due to health and safety concerns, technical challenges, and high cost. Additionally, all options considered for the physical inspection of the interior of the Siphon introduced the potential to damage the structural integrity of the Siphon. The Siphon was constructed in approximately 1926 and is probably approaching the end of its design life. It is possible that the concrete and steel used to construct the Siphon may have degraded over time and any direct physical efforts to sample the Siphon could damage the Siphon.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

This section of the ROD summarizes the current and potential (i.e., reasonably anticipated) future land and resource uses at the Site and areas surrounding the Site. This information forms the basis for the exposure assessment assumptions and risk characterization conclusions discussed in Section 2.7 (Summary of Site Risks).

Ground water is not the primary source of water near the Site. Hidalgo County relies primarily on surface water from the Rio Grande River, which provides approximately 98 percent of water used in the Lower Rio Grande Valley (McCoy 1990). As such, it is anticipated that future ground water use will remain the same as the current ground water use in Hidalgo County, which has only limited use as a source of irrigation water, domestic water, and municipal water.

The surface water, supplied by the Irrigation District, is used for the irrigation of agricultural fields, which surround the Site, and for drinking water for the City of Donna and the North Alamo Water Supply Corporation Plant No. 5. It is anticipated that future surface water use will remain the same as the current surface water use in Hidalgo County, which has significant use as a source of municipal water supplies and agricultural irrigation water.

Most of the land area (i.e., soils) near the Site is currently used for commercial agriculture. The primary crops cultivated in Hidalgo County are sugarcane, sorghum, cotton, corn, vegetables, and citrus fruits. In 2006, Hidalgo County was the state's largest sugarcane producer with 882,000 tons harvested and the state's largest producer of grain sorghum with 4,409,000 bushels harvested (Texas Comptroller of Public Accounts 2008). In addition, Hidalgo County contains 85 percent of the citrus acres in Texas, making Texas the nation's third-largest citrus producer (Sauls 2008). It is anticipated that future land use will remain the same as the current land use in Hidalgo County, which has significant use as a source of agricultural production.

The current and potential future land and resource uses for the Site will remain the same. A qualitative assessment of consumption of produce, including livestock, from the adjacent agricultural fields was conducted during the exposure assessment phase of the human health risk assessment (see Section 2.7.1 – Summary of the Human Health Risk Assessment). These exposure routes were considered to contribute insignificant risks due to the type and concentrations of contaminants detected in Site media. Use of the water from the reservoir and canal system as drinking water was also evaluated and found to be safe for human consumption. Based on the ecological risk assessment, cleanup of the Site to human health Remediation Goals will also be protective of ecological receptors (see Section 2.7.2 – Summary of the Ecological Risk Assessment).

2.7 SUMMARY OF SITE RISKS

A Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment (ERA) were conducted to evaluate potential exposure pathways and estimate potential risks posed to human and ecological receptors because of exposure to contaminants in Site media. These assessments provide the basis for taking a remedial action at the Site and identify the contaminants and exposure pathways that will be addressed by the Selected Remedy identified in this ROD.

Section 2.7.1 (Summary of the Human Health Risk Assessment) provides a summary of the relevant portions of the HHRA, as presented in the final Human Health Risk Assessment (Revision 2) (EA 2016b). Section 2.7.2 (Summary of the Ecological Risk Assessment) provides a summary of the relevant portions of the ERA, as presented in the final Ecological Risk Assessment (Revision 3) (EA 2016c). Section 2.7.3 (Basis for Action) discusses the basis for action at the Site.

2.7.1 *Summary of the Human Health Risk Assessment*

The HHRA estimates potential health risks the Site poses to anticipated receptors if no action were taken. It provides the basis for taking a remedial action at the Site and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the HHRA.

Identification of Chemicals of Concern

The following table provides the chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in Site media (i.e., the concentration used to estimate the exposure dose and risk from each COC). The table includes the number of samples for each exposure unit, the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the Site), and what statistical measure was used to derive the EPCs.

Chemicals of Concern and Exposure Point Concentrations

Scenario Timeframe: Current/Future Medium: Surface Water Exposure Medium: Fish Tissue						
Exposure Unit	**Chemical of Concern**	**Concentration Detected (mg/kg)**		**Frequency of Detection**	**Exposure Point Concentration (mg/kg)**	**Statistical Measure**
		Min	**Max**			
Tissue – Buffalo Fillet						
DRCS	Aroclor-1254	0.065	4.5	8/12	1.69	95% UCL
	Aroclor-1260	0.14	3.6	2/12	3.6	Max
	PCB Congeners	0.016	150	3/3	150	Max
Tissue – Gar Fillet						
DRCS	Aroclor-1254	0.15	0.95	3/10	0.45	95% UCL
	Aroclor-1260	0.085	0.83	9/10	0.66	95% UCL
	PCB Congeners	0.41	0.41	1/1	0.41	Max
Tissue – Catfish Fillet						
DRCS	Aroclor-1254	0.043	0.96	8/18	0.34	95% UCL
	Aroclor-1260	0.055	0.72	5/18	0.15	95% UCL
	PCB Congeners	0.0097	4.0	4/4	3.83	95% UCL
Tissue – Largemouth Bass Fillet						
DRCS	Aroclor-1254	0.031	0.14	4/19	0.05	95% UCL
	Aroclor-1260	Not Detected		--	--	--
	PCB Congeners	0.0015	2.1	7/7	2.1	Max
Tissue – Common Carp Fillet						
DRCS	Aroclor-1254	0.0042	1.4	11/36	0.15	95% UCL
	Aroclor-1260	0.037	0.22	2/36	0.22	Max
	PCB Congeners	0.005	7.2	3/3	7.2	Max
Tissue – All Fish Fillet Results						
DRCS	Aroclor-1254	0.0042	4.5	35/105	0.43	95% UCL
	Aroclor-1260	0.037	3.6	18/104	0.23	95% UCL
	PCB Congeners	0.005	150	20/20	29.4	95% UCL

Notes:
95% UCL – 95 percent cent upper confidence limit
DRCS – Donna Reservoir and Canal System
Max – maximum result
Min – minimum result
mg/kg – milligram(s) per kilogram

Exposure Assessment

Based upon the CSM presented in Section 2.5.3 (Conceptual Site Model), the following exposure pathways were quantitatively evaluated in the HHRA:

- Resident adult and child – Ingestion, inhalation, and dermal contact with soil;
- Agricultural worker – Ingestion, inhalation, and dermal contact with soil; and
- Recreational user (adult, adolescent, and child) – Ingestion of and dermal contact with surface water and sediment; ingestion of fish tissue.

Quantitative risk estimates were not calculated for entire age ranges within the receptor groups under the potential exposure scenarios; however, the receptor groups included in the quantitative evaluation were selected to be protective of the entire age range of receptors of concern.

A qualitative assessment of consumption of produce and livestock from the adjacent agricultural fields was also conducted. These exposure routes were considered to contribute insignificant risks due to the type and concentrations of contaminants detected in Site media. Use of the water from the reservoir and canal system as a drinking water source was also evaluated and found to be safe for human consumption.

Exposure pathways are presented in the CSMs (Figure 22 – Human Health Conceptual Site Model, and Figure 27 – Pictorial Conceptual Site Model) and are discussed in further detail in Section 2.2 (Exposure Assessment) of the HHRA (EA 2016b). Appendix A (Summary of Human Health Exposure Factors and Intake Equations) provides a summary of the exposure factors and intake equations used to evaluate potential risks to human receptor groups at the Site.

No unacceptable risks were identified for any receptor group due to exposure to soil, ground water, sediment, or surface water at the Site. Therefore, the subsequent discussions have been limited to exposure media (i.e., fish tissue), exposure routes (i.e., consumption), and the COCs (i.e., Total PCBs) identified as risk drivers at the Site.

Toxicity Assessment

The following tables provide the carcinogenic and noncarcinogenic risk information relevant to the COCs identified in the HHRA (EA 2016b).

Cancer Toxicity Data

Chemical of Concern	Oral Cancer Slope Factor	Oral Absorption Efficiency for Dermal (GI ABS)(1)	Absorbed Cancer Slope Factor for Dermal (2)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (3) (mm/dd/yyyy)
Aroclor-1254	2.0	1	2.0	per (mg/kg-day)	B2	IRIS	8/10/2015
Aroclor-1260	2.0	1	2.0	per (mg/kg-day)	B2	IRIS	8/10/2015
PCB Congeners	2.0	1	2.0	per (mg/kg-day)	B2	IRIS	8/10/2015

Notes:

(1) Taken from EPA 2004 Guidance.
(2) Dermal Toxicological values adjusted from oral values using USEPA 2004 recommended chemical-specific gastrointestinal absorption factors (GI ABS). Cancer Slope Factors are divided by the GI ABS.
(3) IRIS - Integrated Risk Information System. For IRIS values, the date IRIS was searched is provided.

Weight of Evidence:

A - Human carcinogen
B1 - Probable human carcinogen - indicate that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Non-Cancer Toxicity Data

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value (mg/kg-day)	Oral to Dermal Adjustment Factor[1] (GI ABS)	Adjusted Dermal RfD[2] (mg/kg bw-day)	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ[3] (mm/dd/yyyy)
Aroclor-1254	Chronic	2.0E-05	1	2.0E-05	Skin	300/1	IRIS	8/10/2015
Aroclor-1260	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
PCB Congeners	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015

Notes:
mg/kg-day – milligrams per kilogram per day
mg/kg bw-day – milligrams per kilogram of body weight per day
NA - Not Applicable
RfD - Reference Dose

(1) Taken from EPA 2004 Guidance.
(2) Dermal toxicological values adjusted from oral values using EPA 2004 recommended chemical-specific gastrointestinal absorption factors (GI ABS). RfDs are multiplied by the GI ABS.
(3) IRIS - Integrated Risk Information System. For IRIS values, the date IRIS was searched is provided.

Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime because of exposure to a potential carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$Risk = LADI \times SF$$

Where:

Risk = Unitless probability (e.g., 2×10^{-5}) of an exposed individual developing cancer

LADI = Lifetime cancer average daily intake (mg/kg/day)

SF = Cancer slope factor $(mg/kg/day)^{-1}$

These risks are probabilities that are usually expressed in scientific notation (e.g., 1×10^{-6} or 10^{-6}). An excess lifetime cancer risk of 10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of Site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or excessive exposure to sunlight. The chance of an individual developing cancer from other causes has been estimated to be as high as one in three. The EPA's generally acceptable risk range for Site-related exposures is 10^{-4} to 10^{-6}.

The potential for non-carcinogenic effects is evaluated by comparing the average daily intake (ADI) to the chemical-specific reference dose (RfD). An RfD represents a level that an individual may be exposed to that is not expected to cause deleterious effects. The ratio of exposure to toxicity is called a hazard quotient (HQ), which is derived as shown in the equation below:

$$HQ = \frac{ADI}{RfD}$$

Where:

HQ = Hazard quotient; ratio of average daily intake level to acceptable daily intake level (unitless)

ADI = Calculated non-carcinogenic average daily intake (mg/kg/day or mg/m^3)

RfD = Reference dose (mg/kg/day)

If the ADI exceeds the RfD, the HQ will exceed a ratio of one (1.0) and there may be concern that potential adverse systemic health effects will be observed in the exposed populations. If the ADI does not exceed the RfD, the HQ will not exceed 1.0 and there will be no concern that potential adverse systemic health effects will be observed in the exposed populations. However, if the sum of several HQs exceeds 1.0, and the contaminants affect the same target organ, there may be concern that potential adverse systemic health effects will be observed in the exposed populations. In general, the greater the value of the HQ above 1.0 the greater the level of concern; however, the HQ does not represent a statistical probability that an adverse health effect will occur.

For consideration of exposures to more than one chemical causing systemic toxicity via several different pathways, the individual HQs are summed to provide an overall hazard index (HI). If the HI is less than 1.0, then no adverse health effects are likely to be associated with exposures at the Site. However, if the total HI is greater than 1.0, separate endpoint-specific HIs may be calculated based on toxic endpoint of concern or target organ (e.g., HQs for neurotoxins are summed separately from HQs for renal toxins). Only if an endpoint-specific HI is greater than 1.0 is there reason for concern about potential health effects for that endpoint.

The HHRA evaluated potential risks due to the consumption of fish (i.e., fish fillets) based on the fish tissue results. It also evaluated potential risks based on consumption of individual fish species. Individual fish species evaluated during the HHRA included catfish, buffalo, gar, largemouth bass, and the common carp. The results of the HHRA determined that there were unacceptable risks associated with each of the individual fish species evaluated, and cleanup goals at the Site would be applicable to all fish species. Therefore, the summary of cancer and non-cancer risks presented in this section of the ROD have been limited to those results calculated based on the entire fish tissue data set collected from the Site. The results of individual species evaluations are included in the HHRA (EA 2016b).

The HHRA identified PCBs in fish tissue as the primary risk drivers at the Site and evaluated potential risks for individual Aroclors as well as Total PCB Congeners. However, the data set for PCB Congeners was significantly smaller than that of the individual Aroclors, with 105 fish tissue samples analyzed for Aroclors, and only 20 samples analyzed for PCB Congeners. For many of the tissue samples, the individual

Aroclors and PCB Congener analysis was not performed on the same sample; therefore, the results for the PCB Congeners were evaluated separately from other contaminants in fish tissue. The evaluation of individual fish species was also not performed for the PCB Congener evaluation due to the low number of samples analyzed for PCB Congeners within each species. Risks for Total PCB Congeners were evaluated assuming a high-risk PCB. As a result, only carcinogenic toxicity values are available for Total PCB Congeners, and an estimate of non-carcinogenic hazards is not available.

The following tables provide a summary of cancer and non-cancer risks for the COCs and exposure media identified as risk drivers at the Site. The following risk estimates are based on a reasonable maximum exposure, which is defined as the highest exposure that could reasonably be anticipated to occur for a given exposure pathway and scenario at the Site. Additional discussion is provided in Section 3.0 (Human Health Risk Assessment Results) of the HHRA (EA 2016b).

Risk Characterization Results for the Adult Recreational User

Cancer Risks for Adult Recreational Users – Individual Aroclors

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Cancer Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	Aroclor-1254	1.0E-04	--	--	1.0E-04
			Aroclor-1260	5.5E-05	--	--	5.5E-05
			(Total)	1.6E-04	---	---	1.6E-04
						Total Risk Across Fish	**2E-04**

Cancer Risks for Adult Recreational Users – Total PCB Congeners

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Cancer Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	PCB Congeners	7.2E-03	--	--	7.2E-03
			(Total)	7.2E-03	---	---	7.2E-03
						Total Risk Across Fish	**7E-03**

Non-Cancer Hazards for Adult Recreational Users

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Non-Cancer Hazard Quotient				
				Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	Aroclor-1254	Skin	7.0	--	--	7.0
			Aroclor-1260	NA	--	--	--	--
			(Total)		7.0	---	---	7.0
							Total Hazard Index Across Fish	**7.0**

As shown in the risk characterization tables for the adult recreational user, the cumulative cancer risk estimate for the adult recreational user (i.e., 2×10^{-4}) exceeded the EPA's acceptable cancer risk range based on exposure to individual Aroclors through consumption of fish tissue. Cancer risk estimates based on Total PCB Congeners (i.e., 7×10^{-3}) also exceeded the EPA's acceptable cancer risk range. In addition, the calculated non-cancer HI exceeded the acceptable threshold of 1.0, with Aroclor-1254 (i.e., HQ = 7.0) identified as a COC with a HQ exceeding 1.0.

Risk Characterization Results for the Adolescent Recreational User

Cancer Risks for Adolescent Recreational Users – Individual Aroclors

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Cancer Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	Aroclor-1254	5.3E-05	--	--	5.3E-05
			Aroclor-1260	2.8E-05	--	--	2.8E-05
			(Total)	8.1E-05	---	---	8.1E-05
						Total Risk Across Fish	**8E-05**

Cancer Risks for Adolescent Recreational Users – Total PCB Congeners

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Cancer Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	PCB Congeners	3.7E-03	--	--	3.7E-03
			(Total)	3.7E-03	---	---	3.7E-03
						Total Risk Across Fish	**4E-03**

Non-Cancer Hazards for Adolescent Recreational Users

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Non-Cancer Hazard Quotient				
				Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	Aroclor-1254	Skin	9.3	--	--	9.3
			Aroclor-1260	NA	--	--	--	--
				(Total)	9.3	---	---	9.3
							Total Hazard Index Across Fish	**9.3**

As shown in the risk characterization tables for the adolescent recreational user, the cancer risk estimate for the adolescent recreational user (i.e., 8×10^{-5}) was found to be near the upper end of the EPA's acceptable cancer risk range based on exposure to individual Aroclors through consumption of fish tissue. Cancer risk estimates based on Total PCB Congeners (i.e., 4×10^{-3}) exceeded the EPA's acceptable cancer risk range. In addition, the calculated non-cancer HI exceeded the acceptable threshold of 1.0, with Aroclor-1254 (i.e., HQ = 9.3) identified as a COC with a HQ exceeding 1.0.

Risk Characterization Results for the Child Recreational User

Cancer Risks for Child Recreational Users – Individual Aroclors

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Cancer Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	Aroclor-1254	3.2E-05	--	--	3.2E-05
			Aroclor-1260	1.7E-05	--	--	1.7E-05
			(Total)	4.9E-05	---	---	4.9E-05
						Total Risk Across Fish	**5E-05**

Cancer Risks for Child Recreational Users – Total PCB Congeners

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Cancer Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	PCB Congeners	2.2E-03	--	--	2.2E-03
			(Total)	2.2E-03	---	---	2.2E-03
						Total Risk Across Fish	**2E-03**

Non-Cancer Hazards for Child Recreational Users

Location: Donna Reservoir and Canal System (DRCS)
Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Non-Cancer Hazard Quotient				
				Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	Aroclor-1254	Skin	19	--	--	19
			Aroclor-1260	NA	--	--	--	--
				(Total)	19	---	---	19
							Total Hazard Index Across Fish	**19**

As shown in the risk characterization table for the child recreational user, the cancer risk estimate for the child recreational user (i.e., 5×10^{-5}) was within the EPA's acceptable cancer risk range based on exposure to individual Aroclors through consumption of fish tissue. Cancer risk estimates based on Total PCB Congeners (i.e., 2×10^{-3}) exceeded the EPA's acceptable cancer risk range. In addition, the calculated non-cancer HI exceeded the acceptable threshold of 1.0, with Aroclor-1254 (i.e., HQ=19) identified as a COC with a HQ exceeding 1.0.

Uncertainties in the Human Health Risk Assessment

There are numerous uncertainties involved in the HHRA process. The HHRA for the Site identified the following as sources of potential uncertainty related to the risk assessment:

- Evaluation of dioxin-like PCB Congeners was not included in the overall quantitative evaluation of PCB-related risks. A separate quantitative evaluation, conducted as part of the HHRA uncertainty section, was performed. This evaluation demonstrated that Total PCB Congener risks were higher; although, concentrations of dioxin-like PCB Congeners in fish tissue do have the potential to pose unacceptable cancer and non-cancer risks. Therefore, any remedial

actions or risk management decisions made to address risks from Total PCBs would also address risks posed by the dioxin-like PCB Congeners.

- The field sampling plan can have a significant impact on the results obtained in calculating human health risks at a site. Samples collected within the reservoir and canal system were collected from separate exposure areas that span the entire length of the Site. As a result, this reduces the uncertainties associated with biased sampling. Additionally, samples for various media were also collected for several years. The number of samples and variance in the sample collection times aid in the statistical evaluation of EPCs. Uncertainties associated with sampling and analyses are expected to be low.
- Specific canal segments along the reservoir and canal system revealed higher levels of PCBs in sediment; however, the evaluation of fish tissue results was based upon the collection of fish tissue along the entire reservoir and canal system. This decision was made due to the mobility of fish across the system and because fishers are expected to use the entire reservoir and canal system and not only collect fish from isolated areas for long periods of time. Fish collected from areas with higher concentrations of PCBs in sediment may have the potential to pose higher risks for fishers, but the entire reservoir and canal system presents potential human health risk concerns from the consumption of fish.
- In circumstances where the frequency of detection is low it becomes challenging to perform the necessary statistics to calculate an EPC, and the results are considered unreliable. Therefore, for chemicals with a low frequency of detection, the maximum detected concentration was used as the EPC. This can result in an overestimate of potential risks when evaluating long term exposures.
- Much of the toxicological information comes from experiments with laboratory animals. Experimental animal data have been relied on by regulatory agencies to assess the hazards of chemical exposures to humans. Interspecies differences in chemical absorption, metabolism, excretion, and toxic response are not well understood; therefore, conservative assumptions are applied to animal data when extrapolating to humans. In general, conservative assumptions are made throughout the toxicity assessment, which can result in an overestimate of risk.
- Much of the toxicological information for carcinogenic assessments comes from experiments with laboratory animals. There is uncertainty about whether animal carcinogens are also carcinogenic in humans. While many chemical substances are carcinogenic in one or more animal species, only a very small number of chemical substances are known to be human carcinogens. The fact that some chemicals are carcinogenic in some animal species, but not in others, raises the possibility that not all animal carcinogens are human carcinogens. Regulatory agencies assume that humans are as sensitive to carcinogens as the most sensitive animal species. This policy decision, designed to prevent underestimation of risk, introduces the potential to overestimate carcinogenic risk.

- Differences in individual human susceptibilities to the effects of chemical exposures may be caused by such variables as genetic factors (e.g., glucose-6-phosphate dehydrogenase deficiency), lifestyle (e.g., cigarette smoking and alcohol consumption), age, hormonal status (e.g., pregnancy), and disease. To account for the diversity of human populations and their differing susceptibilities to chemically induced injury or disease, a safety factor is used. The EPA uses a factor between 1 and 10, and this uncertainty may lead to overestimates of human health effects at given doses.
- When experimental data available on one route of administration are different from the actual route of exposure that is of interest, route-to-route extrapolation must be performed before the risk can be assessed. Several criteria must be satisfied before route-to-route extrapolation can be undertaken. The most critical assumption is that a chemical injures the same organ(s) regardless of route, even though the injury can vary in degree. Another assumption is that the behavior of a substance in the body is similar by all routes of contact. This may not be the case when, for example, materials absorbed via the gastrointestinal tract pass through the liver prior to reaching the systemic circulation, whereas by inhalation the same chemical will reach other organs before the liver. However, when data are limited, these extrapolations are made and may result in overestimates of human toxicity.

Conclusions of the Human Health Risk Assessment

The HHRA identified potential concerns for human health from the consumption of fish collected from the reservoir and canal system. The HHRA results reveal that if no remedial action or other means of control is taken, there is a potential for an increased probability of cancer for adult recreational users above the EPA's acceptable cancer risk range, including a potential for systemic non-cancer effects to all recreational receptors. Direct contact with other potentially affected media (i.e., soil, surface water, and sediment), which includes the consumption of produce from the surrounding agricultural fields and consumption of drinking water from the reservoir and canal system, does not pose unacceptable human health concerns. Based on the results of the HHRA, Aroclor-1254, Aroclor-1260, and Total PCB Congeners have been identified as the only Site-related human health COCs for the consumption of fish.

2.7.2 *Summary of the Ecological Risk Assessment*

An ERA was completed to characterize and quantify potential environmental impacts to ecological receptors from chemicals in soil, sediment, surface water, and fish at the Site (EA 2016c). The ERA initially used conservative assumptions regarding exposure and toxicity to develop a CSM and identify contaminants of potential concern (COPCs). The preliminary results based on these conservative assumptions represent maximum estimates of risk, and are not necessarily representative of population-wide risks; therefore, additional data evaluation and risk characterization that relied on Site-specific information was conducted to calculate more realistic and receptor-specific risk estimates to draw conclusions.

Exposure Assessment

For the ERA, the Site was divided into five separate exposure areas based on potential sources of contamination, habitat, and hydraulic connectivity. Figure 23 (Ecological Exposure Areas) of this ROD depicts the exposure areas that were used to group data for evaluation in the ERA. Section 2.5 (Site Characteristics) of this ROD provides a description of the vegetation, fish, and birds that may potentially be present the Site.

Ecological Receptors and Representative Receptor Species

Based on the ecological setting and media of concern discussed in Section 2.5 (Site Characteristics) of this ROD, ecological receptors potentially present at the Site include plants, soil invertebrates, wildlife (i.e., birds and mammals), benthic invertebrates, aquatic organisms, reptiles, and amphibians.

Specific receptor groups and representative receptor species were selected to represent each of the ecological resource categories identified at the Site. Selection of representative receptor species is based primarily on several factors: 1) the likelihood of a species to use the Site and the area immediately surrounding the Site, 2) the potential for exposure to Site-related contaminants based on the feeding habits and life history of the organisms/guild represented by the receptor species, 3) the availability of life history and exposure information for the selected receptor species, and 4) the availability of toxicity information for the representative receptor species. Representative receptor species selected and evaluated in the ERA included the following:

- Terrestrial plants – multiple species
- Soil invertebrates – earthworm
- Terrestrial herbivorous birds – northern bobwhite (*Colinus virginianus*)
- Terrestrial omnivorous birds – American robin (*Turdus migratorius*)
- Predatory birds – red-tailed hawk (*Buteo jamaicensis*)
- Terrestrial herbivorous mammals – white-footed mouse (*Peromyscus leucopus*)
- Terrestrial insectivorous mammals – least shrew (*Cryptotis parva*)
- Predatory mammals – coyote (*Canis latrans*)
- Aquatic herbivorous birds – Canada goose (*Branta canadensis*)
- Aquatic insectivorous birds – laughing gull (*Egretta thula*)
- Small piscivorous birds – belted kingfisher (*Megaceryle alcyon*)
- Large piscivorous birds – great blue heron (*Ardea herodias*)
- Aquatic herbivorous mammals – nutria (*Myocaster coypus*)
- Aquatic carnivorous mammals – raccoon (*Procyon lotor*)
- Piscivorous mammals – river otter (*Lutra canadensis*)
- Benthic invertebrates – multiple species
- Aquatic organisms – multiple species
- Amphibians – American bullfrog (*Rana catesbeiana*)
- Reptiles – diamondback water snake (*Nerodia rhombifer*)

Measurement endpoints selected to complete the ERA are presented in Table 1 (Measurement Endpoints for Ecological Risk Assessment). The CSM used in the ERA is presented in Figure 24 (Ecological Conceptual Site Model).

Threatened and Endangered Species

The Texas Parks and Wildlife Department Texas Natural Diversity Database was used as a source to determine the list of threatened and endangered species likely to be present at the Site. In the absence of a Site-specific wildlife survey, the ERA made the conservative assumption that any threatened or endangered species that could occur within Hidalgo County could be present at the Site.

Several T&E species were evaluated during the ecological risk assessment. These T&E species included the Coues' rice rat, interior least tern, reddish egret, false spike mussel, Salina mucket, and Texas hornshell. Some or all of these species may or may not be present at the Site because of limited habitat. According to the Texas Parks and Wildlife the Coues' rice rat prefers habitat in cattail-bulrush marshes and aquatic grassy zones near oxbow lakes. From aerial photographs, the Northwest Reservoir appears to be the remnants of an oxbow lake; however, this portion of the reservoir system comprises a relatively small area in comparison to the entire reservoir and canal system. The canals are not a suitable habitat for this T&E species.

For each species that may be present, a surrogate receptor was identified and carried through the ERA. The following receptors were identified as surrogate receptors for at least one T&E species: American robin, red-tailed hawk, least shrew, coyote, laughing gull, belted kingfisher, great blue heron, raccoon, multiple species of benthic invertebrates, multiple species of aquatic organisms, American bullfrog, and the diamond back water snake (Table 2 – Threatened and Endangered Species that may be found in Hidalgo County).

Identification of Chemicals of Potential Concern

The ERA evaluated samples collected from the Site to identify COPCs in Site media. Samples evaluated in the ERA included surface water, sediment, soil, fish tissue, and mollusk tissue. COPCs were selected by comparison of maximum detected concentrations found in Site media within each exposure area to conservative ecological risk screening values. Chemicals with concentrations that equaled or exceeded screening values were retained as COPCs. Chemicals that lacked media-specific screening criteria were also retained as COPCs for further evaluation. Chemicals with maximum concentrations that were below screening values were dismissed from further consideration. The COPC screening tables for each area identified in Figure 23 (Ecological Exposure Areas) are presented in Appendix B (Selection of Chemicals of Potential Concern).

Ecological Risk Characterization

COPCs initially identified in the ERA were evaluated using a combination of direct exposure, uptake, and food web models that incorporated receptor-specific toxicity reference values, exposure factors, and conservative assumptions to calculate potential risks based on contaminant concentrations detected in Site media. Results of the initial evaluation identified potential risks to several receptors because of exposure to chemicals detected in Site media. Further evaluation of the results considered additional Site-specific information including spatial extent, magnitude of exceedance, and fate and transport information to refine the results and determine if further action was required to mitigate potential ecological risks. A complete discussion of the risk characterization is presented in the ERA (EA 2016c). Based on the results of this analysis, PCBs were retained as the only Site-related ecological COCs requiring further action. Acceptable ecological risks were found for Exposure Area 1 (Upstream of the Siphon) and Exposure Area 2 (Arroyo Colorado). The following table provides a summary of potentially unacceptable ecological risks identified by the ERA in the remaining exposure areas (EA 2016c).

Summary of Potential Risks Identified by the Ecological Risk Assessment

Exposure Area	Receptor	Media	Chemical of Concern
3: LWMCU at Siphon Exit	Small Piscivorous Birds	Fish Tissue	Total PCB Congeners
	Piscivorous Mammals	Fish Tissue	Total PCB Congeners, Total PCB Aroclors
	Benthic Invertebrates	Sediment	Aroclor-1254, Total PCB Congeners, Total PCB Aroclors
	Threatened and Endangered Species		
	Interior Least Tern	Fish Tissue	Aroclor-1254, Total PCB Congeners, Total PCB Aroclors
	Reddish Egret	Fish Tissue	Total PCB Congeners
	Coues' Rice Rat	Sediment via ingestion of benthos	Aroclor-1242, Aroclor-1260, Total PCB Congeners, Total PCB Aroclors,
	False Spike Mussel, Salina Mucket, and Texas Hornshell	Sediment	Aroclor-1242, Aroclor-1254, Aroclor-1260, Total PCB Congeners, Total PCB Aroclors
4: LWMCU Downstream of the Siphon	Small Piscivorous Birds	Fish Tissue	Total PCB Congeners
	Piscivorous Mammals	Fish Tissue	Total PCB Congeners, Total PCB Aroclors
	Threatened and Endangered Species		
	Interior Least Tern	Fish Tissue	Aroclor-1254, Total PCB Congeners, Total PCB Aroclors
	Reddish Egret	Fish Tissue	Total PCB Congeners
	Coues' Rice Rat	Benthos Tissue	Total PCB Congeners, Total PCB Aroclors
5: Lined Canals, Reservoirs, and Soil	Threatened and Endangered Species		
	Coues' Rice Rat	Sediment via ingestion of benthos	Total PCB Congeners, Total PCB Aroclors

Note:
There is uncertainty associated with threatened and endangered species, for which little data are available regarding their actual presence at the Site.
LWMCU – Lower West Main Canal Unlined
PCB – Polychlorinated Biphenyls

Conclusions of the Ecological Risk Assessment

The ERA evaluated risk based on exposure groupings; however, a single set of ecological Preliminary Remediation Goals (PRGs) was developed to ensure consistency in risk management actions applicable across the entire Site. The ERA determined that benthic invertebrates, piscivorous mammals, small piscivorous birds, and several T&E species (i.e., interior least tern, reddish egret, Coues' rice rat, false spike mussel, Salina mucket, and Texas hornshell) represented the most sensitive receptors evaluated for effects from PCBs. Therefore, PRG development focuses on these receptors. Risk-based thresholds of effects were developed for use as risk-based PRGs for sediment. Background was not considered because PCBs are anthropogenic and were detected in very few samples upstream of the Siphon.

A summary of the potential PRGs for ecological receptors determined, during the FS, is provided in the following table.

Potential Ecological Preliminary Remediation Goals

Chemical of Concern	Receptor	Sediment Preliminary Remediation Goal (mg/kg)	Note
Total PCBs	Small Piscivorous Birds General Population	0.483	NOAEL-LOAEL midpoint. Intended for application as a reach-wide average.
Total PCBs	Piscivorous Mammals General Population	0.071	NOAEL-LOAEL midpoint. Intended for application as a reach-wide average.
Total PCBs	Benthic Invertebrates General Population	0.68	Probable Effect Concentration. Intended for application on a point-by-point basis or as an average across small areas.
Total PCBs	Interior Least Tern	0.088	NOAEL. Intended for application on a point-by-point basis.
Total PCBs	Reddish Egret	0.088	NOAEL. Intended for application on a point-by-point basis.
Total PCBs	Coues' Rice Rat	0.023	NOAEL. Intended for application on a point-by point basis, applicable to the reservoir only. Reservoir is already in compliance.
Total PCBs	False Spike Mussel, Salina Mucket, Texas Hornshell	0.06	Threshold Effects Concentration. Intended for application on a point-by-point basis or as an average across small areas.

Note:
LOAEL – lowest observed adverse effect level
mg/kg – milligrams per kilogram (dry weight)
NOAEL – no observed adverse effect level
Total PCBs – Either the sum of polychlorinated biphenyls (PCBs) as Aroclors or the sum of individual PCB congeners.

Lowest Sediment Ecological Preliminary Remediation Goal

The sediment PRG for the Coues' rice rat of 0.023 mg/kg Total PCBs is the lowest of all ecological PRGs, and thus would drive remediation. Given that the presence of the Coues' rice rat has not been established for the Site, it is important to consider habitat

and which areas of the Site this receptor may utilize. According to the TPWD, the habitat preference for the Coues' rice rat is cattail-bulrush marsh and aquatic, grassy zones near oxbow lakes. The only portions of the reservoir and canal system that supports comparable habitat are portions of the reservoir, which include some areas of emergent vegetation and forested wetlands. None of the samples collected from the reservoir exceeded the sediment ecological PRG of 0.023 mg/kg Total PCBs (i.e., the highest detection was 0.014 mg/kg) and thus the reservoir does not require risk management for ecological receptors.

The canals do not provide habitat consistent with the needs of the Coues' rice rat. Most of the shoreline along the 7.6 miles of canal is highly disturbed. A total of 3.5 miles is lined with concrete and does not provide vegetative habitat that would support use by the species. Of the remaining 4.1 miles that are unlined, habitat consists of a grassy strip of fragmented shoreline vegetation between the canal and access roads. The shorelines are steep and support a marsh border of less than 1 to 3 feet. Several areas of shoreline vegetation are dominated by giant reed (i.e., Phragmites australis), an invasive species. Based on this information, the canals provide habitat that is largely inconsistent with Coues' rice rat habitat preferences. Therefore, the ecological PRG of 0.023 mg/kg has not been applied to sediment in the canals in favor of goals for species that may actually be present.

2.7.3 *Basis for Action*

The response action selected in this ROD is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment. The Selected Remedy is warranted because the HHRA determined that exposure to PCBs through consumption of fish poses unacceptable human health cancer risks and non-cancer hazards. Reducing PCB levels in fish and preventing consumption of contaminated fish are two ways to reduce risk. To reduce PCB levels in fish, it is necessary to reduce PCB levels in sediment (i.e., canal dredging/excavation) and mitigate releases of contaminants from the likely source of PCBs (i.e., the Siphon). The ERA identified potential concerns for ecological receptors. Meeting the human health Cleanup Level for sediment will also address the lowest applicable sediment PRG for ecological receptors, including the Texas Risk Reduction Program Sediment Protective Concentration Levels established pursuant to 30 Texas Administrative Code 305.75.

2.8 REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) for the Site describe what the proposed Site cleanup is expected to accomplish. According to the NCP, 40 CFR §300.430(a)(1)(i), the ". . . national goal of the remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste." Cleanup Levels (CULs) and Remediation Goals (RGs) are contaminant-specific concentrations used to measure the success of the Selected Remedy in meeting the RAOs during and after the implementation of the remedy. Based on the information relating to the types of contaminants, environmental media of

concern, and potential exposure pathways, the following Site-specific RAOs, CULs, and RGs were developed:

RAO 1: Reduce the long-term human health cancer risks and the non-cancer hazards from human consumption of Site fish contaminated with PCBs. This goal will be achieved by reducing the concentrations of PCBs in sediment downstream from the likely source (i.e., the Siphon) and mitigating the transport pathway from the Siphon into the Site.

- Sediment CUL – The long-term objective will be achieved by reducing the concentration of PCBs in sediment, downstream of the Siphon's exit, to less than 0.043 mg/kg Total PCBs. This will achieve a Site-wide acceptable risk level of 10^{-5} adult recreational user cancer risk and a child recreational user HI of 1 from the consumption of fish.
- Fish Tissue RG – The long-term objective will also be achieved by reducing the concentration of PCBs in fish tissue, throughout the reservoir and canal system, to less than 0.031 mg/kg Total PCBs. Progress toward this objective will be measured by performing statistical analyses of fish tissue.

RAO 2: Reduce the short-term human health cancer risks and the non-cancer hazards from human consumption of Site fish contaminated with PCBs.

- The short-term objective will be achieved by reducing or removing the fish from the Site possibly contaminated with PCBs and available for human consumption. Progress toward this objective will be measured by the number, species, and size of the fish removed from the reservoir and canal system. Fish tissue will also be monitored for the concentrations of Total PCBs described under RAO 1.

RAO 3: Reduce the risks to ecological receptors (i.e., small piscivorous birds, piscivorous mammals, benthic invertebrates, and threatened/endangered species) from exposure to PCBs in sediment.

- Reducing the concentration of PCBs in sediment, downstream of the Siphon's exit, to less than 0.043 mg/kg Total PCBs will also be protective of ecological receptors.

Reducing the exposure of human and ecological receptors of concern to PCBs will mitigate Site baseline risks identified in the HHRA and ERA, as discussed in Section 2.7 (Summary of Site Risks) of this ROD. The quantitative RG and CUL that need to be met to achieve the RAOs are presented in the following table and are further discussed in the following sections of this ROD.

Chemicals of Concern and Remediation Goal and Cleanup Level

Chemical of Concern	Media	Remediation Goal and Cleanup Level	Basis for Remediation Goal and Cleanup Level
Total PCBs	Fish Tissue RG	0.031 mg/kg[1]	Calculated human health risk-based value
Total PCBs	Sediment CUL	0.043 mg/kg[2]	Calculated human health risk-based value

Note:
[1] This concentration corresponds to an Aroclor-1254 child recreational user non-cancer HI of 1.
[2] This concentration is also protective of the ecological receptors of concern.
mg/kg – milligrams per kilogram
RG – Remediation Goal
CUL – Cleanup Level
Total PCBs – The sum of polychlorinated biphenyls measured as either Aroclors or Congeners

2.8.1 *Human Health Remediation Goal and Cleanup Level*

Risk results from the HHRA were reviewed to determine a fish tissue RG and sediment CUL for the Site. Aroclor-1254, Aroclor-1260, and Total PCB Congeners were identified as COCs for recreational users from the ingestion of fish tissue. Determination of a fish tissue RG is based upon both the PCB cancer slope factors and the exposure parameters presented for each receptor in the HHRA (EA 2016b). Cancer slope factors for both the Aroclors and Total PCB Congeners were assumed a “high risk” PCB at 2.0 mg/kg-day. Non-cancer reference doses are only set forth for Aroclor-1254. The selected RG of 0.031 mg/kg Total PCBs in fish tissue will meet a recreational fisher exposure scenario noncancer HI of 1, which is below a recreational fisher exposure scenario cancer risk level of 10^{-5} (i.e., 0.041 mg/kg Total PCBs).

Sediment is a primary source of PCBs at the Site that results in fish PCB body burdens which are taken up through the food web into fish. Site-specific bioaccumulation factors were determined to derive a sediment CUL protective of human receptors from the ingestion of fish. Bioaccumulation factors are the ratio of PCBs in fish fillets to the concentration in sediment at a steady state, where the organism can take in the contaminant through ingestion of its food as well as through direct contact. The Site-specific bioaccumulation factor for fish fillets is 9.54 mg/kg wet weight organism/mg/kg dry weight sediment. Sediment cleanup goals were then calculated with the Site-specific bioaccumulation factor based on targeted fish tissue concentrations. The resulting Total PCB sediment CUL is 0.043 mg/kg.

An analysis of the PCB concentrations in sediment across the reservoir and canal system was completed assuming the removal of the sediment locations that exceed the CUL of 0.043 mg/kg Total PCBs. The resulting overall 95 percent upper confidence limit (95% UCL) was determined to be 0.00276 mg/kg Total PCBs in the remaining sediment. This concentration would theoretically, with time, result in fish tissue concentrations below the RG of 0.031 mg/kg Total PCBs for fish tissue. This long-term objective will be achieved by reducing the concentration of PCBs in fish tissue,

throughout the reservoir and canal system, to less than 0.031 mg/kg Total PCBs. The 95% UCL, or other statistical parameter(s), will be used to measure the attainment of this RG. The sampling frequency and the period to achieve this objective will be determined during the remedial design of the Selected Remedy.

A statistical analysis of the PCB concentrations in sediment across the reservoir and canal system, assuming removal of the sediment locations that exceed a concentration of 0.043 mg/kg Total PCBs, results in a Site-wide sediment concentration below the 10^{-5} adult recreational user cancer risk level and the Aroclor-1254 child recreational user non-cancer HI of 1. The statistical analysis of the PCB concentrations in remaining sediment across the reservoir and canal system, after removal of the sediment locations that exceed a CUL of 0.043 mg/kg, results in an overall 95% UCL of 0.00276 mg/kg Total PCBs in sediment. This concentration is below the calculated sediment CUL based on, 1) a 10^{-5} adult recreational user cancer risk level corresponding to 0.004 mg/kg, and 2) an Aroclor-1254 child recreational user non-cancer HI of 1 corresponding to 0.003 mg/kg. The 95% UCL provides reasonable confidence that the true Site average will not be underestimated. An estimate of average concentration is used because: 1) carcinogenic and chronic non-carcinogenic toxicity criteria are based on lifetime average exposures, and 2) an average concentration is most representative of the concentration that would be contacted at the Site over time by both human and ecological receptors.

During the remedial process a concentration equivalent to a lifetime cancer risk of 10^{-6} is first established as a point of departure and then other factors are considered to determine where within the acceptable risk range of 10^{-4} to 10^{-6} a CUL(s) or RG(s) for a given contaminant at a specific site should be established. The EPA is proposing a departure from a cleanup goal of 10^{-6} for this Site based on: 1) consistency with the Texas Risk Reduction Program (TRRP), which is also cost effective, and 2) existing Site soil and sediment PCB concentrations.

A chemical-specific cancer risk of 10^{-5} was chosen because the future anticipated reuse for the Site is recreational, and this risk level is consistent with the TRRP risk level of 10^{-5} (Title 30 Texas Administrative Code Chapter 350.74). To be consistent with the TRRP risk level, the target risk value for the Site moved away from the point of departure of 10^{-6} and is within the target risk range of 10^{-4} to 10^{-6} specified by the NCP.

A human health risk level of 10^{-5} and an HI of 1 are achievable at this Site. The ability to achieve a 10^{-6} risk level may not be possible because of non-Site related influences of PCBs and the extremely low sediment concentration that would be necessary in order to achieve a 10^{-6} risk level (0.0004 mg/kg). Soil samples collected from 10 of 41 locations meet or exceed 0.004 mg/kg Total PCB Aroclors or Total PCB Congeners. Three soil samples were taken from the banks of the Lower West Main Canal Unlined, five from the banks of the Arroyo Colorado River, and two near irrigation risers in adjacent agricultural fields. PCBs in the Arroyo Colorado River exposure area are not considered to be Site-related. The maximum detected Total PCB concentration in the soil of the Arroyo Colorado was 0.013 mg/kg which is more than 3 times the sediment concentration of 0.004 mg/kg corresponding to a 10^{-5} cancer risk level. Concentrations

of Total PCB Congeners in the Arroyo Colorado River soil range from 0.0007 to 0.013 mg/kg with an arithmetic average of 0.004 mg/kg. Soil with concentrations above 0.004 mg/kg may become airborne and deposited in the reservoir and canal system and may complicate attempts to reach sediment levels of 0.004 mg/kg, including the sediment level of 0.0004 mg/kg (which is the sediment concentration corresponding to a 10^{-6} cancer risk level), by serving as a residual source of contamination. Five sediment samples collected upgradient of the Siphon meet or exceed 0.004 mg/kg Total PCBs in sediment. These soil and sediment concentrations are not Site-related and are expected to represent background concentrations.

2.8.2 *Ecological Preliminary Remediation Goal*

A potential sediment ecological PRG of 0.023 mg/kg for Total PCBs was developed during the FS. The most sensitive ecological receptor determined during the ERA was the Coues' rice rat, which may or may not exist at the reservoirs. An analysis of the PCB concentrations in sediment across the reservoir and canal system was completed assuming the removal of the sediment locations that exceed the CUL of 0.043 mg/kg Total PCBs. The resulting overall 95% UCL was determined to be 0.00276 mg/kg Total PCBs in the remaining sediment. Therefore, the selection of the CUL for sediment will also be protective of ecological receptors. The ERA determined that benthic invertebrates, piscivorous mammals, small piscivorous birds, and threatened and endangered species (i.e., interior least tern, reddish egret, Coues' rice rat, false spike mussel, Salina mucket, and Texas hornshell) represented the sensitive ecological receptors evaluated for effects from PCBs (EA 2016c).

2.9 DESCRIPTION OF ALTERNATIVES

Remedial alternatives were developed using general response actions and technologies retained following the screening process presented in the FS (EA 2016d). Remedial alternative components were developed based on the media that they are designed to treat. The following two remedial alternative components were developed for the Siphon to remediate the likely source of PCBs at the Site:

1. Sliplining of the Siphon, and
2. Replacement of the Siphon.

The following three remedial alternative components were developed in the FS (EA 2016d) to remediate the impacted sediment downstream of the Siphon's exit:

1. Canal Dredging,
2. Canal Dredging and Reservoir Monitored Natural Recovery, and
3. Canal Dredging, Reservoir Dredging, and Reservoir Capping.

The following eight remedial alternatives were assembled based upon the remedial alternative components previously listed:

- Alternative 1 – No Further Action.
- Alternative 2 – Limited Action.
- Alternative 3 – Slipline Siphon, Canal Dredging, and Fish Removals.
- Alternative 4 – Slipline Siphon, Canal Dredging, and Reservoir Monitored Natural Recovery.
- Alternative 5 – Slipline Siphon, Canal Dredging, and Reservoir Dredging with Sand Layer.
- Alternative 6 – Replace Siphon, Canal Dredging, and Fish Removals.
- Alternative 7 – Replace Siphon, Canal Dredging, and Reservoir Monitored Natural Recovery.
- Alternative 8 – Replace Siphon, Canal Dredging, and Reservoir Dredging with Sand Layer.

Alternatives 1, 2, 3, and 6 were the only alternatives retained after they were screened for effectiveness, implementability, and cost. Summaries of the retained alternatives and approximate costs are provided in the following sections of this ROD.

2.9.1 *Alternative 1: No Further Action*

Estimated Time for Design/Construction:	*Not applicable*
Estimated Time to Reach Remediation Goals:	*Not applicable*
Estimated Capital Costs:	*$0*
Estimated Lifetime O&M Costs:	*$0*
Estimate Total Present Worth Costs:	*$0*
Discount Rate:	*Not applicable*
Number of Years Costs are Projected:	*Not applicable*

As required by the NCP, 40 CFR § 300.430 (e)(6), the evaluation of alternatives must include a No Further Action (NFA) Alternative. This alternative is used as the baseline alternative against which the effectiveness of all other remedial alternatives is evaluated. Under this alternative, the EPA would take no further action and the contaminants would remain in place and would be subject to environmental influences. No further attempts would be made to reduce the PCB concentrations in fish and sediment or limit consumption of fish with unacceptable levels of PCBs. Additionally, no attempts would be made to slipline/replace the Siphon or remove fish contaminated with PCBs from the Site. Furthermore, no action would be taken to prevent unauthorized access and no institutional controls to inform interested parties regarding the Site conditions would be implemented.

2.9.2 *Alternative 2: Limited Action*

Estimated Time for Design/Construction:	*Not applicable*
Estimated Time to Reach Remediation Goals:	*Not applicable*

Estimated Capital Costs:	*$8,000*
Estimated Lifetime O&M Costs:	*$1,630,000*
Estimate Total Present Worth Costs:	*$1,640,000*
Discount Rate:	*7%*
Number of Years Costs are Projected:	*30 Years*

Alternative 2 (i.e., Limited Action) includes community involvement and institutional controls. Community involvement activities would be performed only as needed for the duration of the remedial action, and would rely on partnerships with state (i.e., TDSHS and TPWD), city (i.e., Cities of Donna and Alamo), and other local entities (i.e., Irrigation District and Hidalgo County [Precincts 1 and 2]), as well as community-based organizations, to develop activities and measures to reduce the public's exposure to fish from the Site.

An institutional control, in the form of a land-use restriction or notice as to the environmental conditions of the property, would be required. The institutional control could consist of either a restrictive covenant or a deed notice. The requirements for filing land use restrictions in the State of Texas are specified in "30 Texas Administrative Code Chapter 350 Subchapter F." A restrictive covenant, or deed notice, is an instrument filed in the real property records of the county where the affected property is located. Additionally, the EPA would coordinate with the TDSHS to maintain the existing Aquatic Life Order Number 9.

Under Alternative 2, no other actions would be taken (i.e., removal of fish or sediment, sliplining or replacement of the Siphon, or performance monitoring of fish and sediment).

2.9.3 *Alternative 3: Slipline Siphon, Canal Dredging, and Fish Removals*

Estimated Time for Design/Construction:	*14 Months (Design), 7 Months (Construction)*
Estimated Time to Reach Remediation Goals:	*After Construction is Complete (Sediment), 10 Years (Fish)*
Estimated Capital Costs:	*$14,410,000*
Estimated Lifetime O&M Costs:	*$1,150,000*
Estimate Total Present Worth Costs:	*$15,600,000*
Discount Rate:	*7%*
Number of Years Costs are Projected:	*10 Years*

Alternative 3 (i.e., Slipline Siphon, Canal Dredging/Excavation, and Fish Removals) includes sliplining the Siphon, to mitigate the transport pathway from the likely PCB source into the Site, and the dredging/excavation of PCB-contaminated sediment with Total PCB concentrations above 0.043 mg/kg downstream of the Siphon's exit. Alternative 3 would also include sediment sampling and monitoring downstream of the Siphon's exit, up to five fish removals over a period of five years, fish tissue sampling, community involvement activities for ten years, maintenance of engineering controls, and the implementation of institutional controls.

Sliplining the Siphon

Sliplining the Siphon would utilize a barrier between the interior wall of the Siphon and the water that flows through it from the Main Canal to the Lower West Main Canal Unlined to isolate contaminant migration pathways. Sliplining of existing pipelines is typically used to restore the structural integrity of a pipeline and is accomplished by installing a smaller pipe into the existing pipeline. The smaller pipe would be anchored into the existing pipeline by filling the void space with grout. Upon completion, the existing Siphon would no longer be in contact with water that flows through the reservoir and canal system.

Prior to sliplining the Siphon, a structural evaluation of the Siphon would be performed. The Siphon was constructed around 1927 and is probably approaching the end of its design life. While sliplining will extend the life of the Siphon, it must withstand the dewatering, uncovering, and slipline installation. It is possible that the concrete and steel may have degraded over time and will not withstand the sliplining process. If the Siphon were to collapse or fail during the sliplining process or after the remediation, another alternative may have to be implemented.

To install the slipline into the Siphon, water in the Siphon would be removed and the area would be prepared for construction activity (i.e. surveyed, cleared of brush, etc.). Temporary cofferdams would be placed at the entrance and exit of the Siphon (i.e., in the Main Canal and Lower West Main Canal Unlined, respectively), and the water would bypass the Siphon through a series of pumps and a temporary pipeline. Centrifugal pumps or similar equipment would be used to empty the water from the Siphon. There would be complexities associated with the installation of a temporary bypass such as obtaining the proper access and coordination with the entities which have jurisdiction over the location of the bypass equipment. The fish in the Siphon at the time of dewatering would be removed and properly disposed of.

After emptying the water from the Siphon, approximately seven temporary access points would be created in areas where directional changes in the Siphon may occur to insert the slipline. Constructing these access points would involve excavation of the overlying material (e.g., soils) and demolition of the top of the Siphon to expose its interior. If needed, access points near the Arroyo Colorado River would require temporary diversion of the river. Cofferdams and dewatering pumps would be used to access these areas. Once the Siphon is open, 20-foot lengths of 96-inch diameter fiberglass reinforced pipe and pipe joints would be pushed into the Siphon. After each segment of pipe is in its final position, the annular space between the Siphon and slipline would be grouted in place. Once the slipline pipes have been installed and anchored, water flow through the Siphon could resume. Although the diameter of the Siphon would be narrowed, the capacity of flow would not be reduced. The friction loss in a fiberglass slipline compared to a concrete pipe would compensate for the reduction of cross sectional area. The estimated length of time required for bypassing the Siphon would be approximately two weeks.

Post slipline installation activities would include backfilling, grading, and planting native vegetation at the temporary access points to prevent erosion in the area. The entire construction phase of the Slipline Siphon component is estimated to take approximately two months to complete.

Sediment sampling would be completed to evaluate the effectiveness of the slipline. Sediment samples would be collected directly downstream of the Siphon's exit, analyzed for Total PCBs, and the results for Total PCBs would be compared to the sediment CUL.

Canal Dredging

The area of remediation under Alternative 3, required to meet the sediment CUL of 0.043 mg/kg Total PCBs, spans the width of the Lower West Main Canal Unlined approximately 4,500 feet beyond the Siphon's exit (i.e., an area approximately 55 feet wide by 4,500 feet in length) as shown in Figure 25 (Sediment Remediation Area Based on a Sediment Cleanup Goal of 0.043 mg/kg). Approximately 20 inches of sediment would be mechanically dredged/excavated from the canal using clamshell excavation methods or similar equipment. A volume of approximately 20,000 cubic yards of sediment would be excavated from the canal, which accounts for approximately 6 inches of operator error during the removal.

During the dredging/excavation of canal sediment, a temporary bridge would be installed adjacent to the existing bridge downstream of the Siphon's exit to allow the agricultural equipment and vehicles to cross the canal during the remedial action. During the remediation of the area, the bridge may be left in place without complicating the remedy. To prevent migration of contamination into the water column and downstream during sediment dredging/excavation activities, silt curtains would be installed to capture the disturbed sediment. Dredging/excavation of the sediment during low water conditions may not require the use of silt curtains. Contaminated material would be partially dewatered on the Site using a series of watertight rolloffs and fractionation tanks, and the sediment would be stabilized and transported to an approved off-site disposal facility. Sediment would be sampled before disposal to ensure compliance with waste disposal requirements. Prior to the restoration of the remediation area, confirmation samples would be collected as necessary to ensure that the remediation satisfies the RAOs for the Site. During remedial action construction, the levees would be stabilized using imported material to protect against construction activity and erosion that may occur.

The estimated construction time for this remedy component is five months, and at no time during these activities would the canal system require shutdown.

Fish Removals

Fish removals would be performed on an annual basis for five years to reduce the exposure pathway to human receptors by removing fish from the reservoir and canal system possibly contaminated with PCBs and which would be available for human consumption. The EPA would consider additional fish removal efforts after the five-year period to determine if additional fish removals should be performed based on whether the RG for Total PCBs in fish tissue is being met. These fish removals would aid in meeting the RAOs for fish tissue and would enhance the effectiveness of the Selected Remedy by achieving the RGs for fish tissue concentration levels, especially in the larger fish which bioaccumulate greater concentrations of PCBs through the food chain.

All areas of the Site will be considered when determining where to conduct fish removals. Fish removals would be accomplished using electrofishing/electroshocking methods. During periods where low water conditions exist at the Site, fish accumulate in certain areas and could be removed using seine netting or other applicable methods. Coordination with the Irrigation District would be required to anticipate low water conditions and plan the fish removals. The fish would be collected in drums and disposed of at an off-site disposal facility. Other fish removal methods (e.g., hoop, fyke, and pound nets, etc.) could be used to supplement the removal efforts.

Fish Tissue Monitoring

Monitoring of fish tissue concentrations would be performed to evaluate potential risks to human health and attainment of the RG for fish tissue. Although the types, number, and locations of fish to be collected during performance monitoring would be determined during the remedial design of the Selected Remedy, bottom feeders and predatory fish could be collected from each of the following five established fish collection areas:

- Main Canal – Near the Rio Grande Pump Station.
- Main Canal – Near the weir and the Siphon’s entrance.
- Lower West Main Canal Unlined – Near the Siphon’s exit.
- Lower West Main Canal Unlined – Near the bridge at FM 1493.
- West Reservoir.

Actual sampling would be determined during the remedial design phase of the Selected Remedy; however, targeted fish could be a minimum of 8 inches in length and processed into fillets in the field or by the laboratory for the analysis of Total PCBs. Collection efforts could focus on the primary targeted species identified in the following table; however, secondary targeted species could be collected if primary targeted species are not available.

Predator Species

- Primary
  - Largemouth Bass
- Secondary
  - Smallmouth Bass
  - Alligator Gar

Bottom Feeder Species

- Primary
  - Smallmouth Buffalo
- Secondary
  - Common Carp
  - Channel Catfish

Sediment Sampling

Sediment sampling of the canal system would be performed to evaluate the performance of the remedy. The frequency of the sampling would be determined during the remedial design of the remedy. Sediment samples collected from the canal system would be analyzed for Total PCBs.

Performance Monitoring

Alternative 3 includes performance monitoring to evaluate whether the RAOs for the Site are being met. Performance monitoring would also be conducted to ensure that the remedy remains protective of human health and the environment. After the completion of the remedy, protectiveness of the implemented remedy would be evaluated during the Five-Year Reviews required by CERCLA for the Site.

Performance monitoring would occur for a period of time beginning with the collection of baseline data. Monitoring would include performance standards related to remedy implementation and would be developed during the remedial design of the remedy described in the ROD. These performance standards, which would be incorporated into design documents, would promote accountability and ensure that the remedy meets the RAOs stated in the ROD.

Institutional Controls

Alternative 3 would continue and/or enhance the Institutional Controls (ICs) for the Site. ICs are non-engineering instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contaminants and/or protect the integrity of a response action by limiting land or resource use. ICs also provide information and notification to interested persons and communities about any residual contamination left at a site and any restrictions because of the remaining contamination. ICs typically are used in conjunction with engineering controls or measures.

The engineering controls considered at this Site, under Alternative 3, are: 1) Sliplining the existing Siphon (i.e., the likely source of the PCBs), and 2) Removal and disposal of the PCB-contaminated sediment located hydraulically downstream from the existing Siphon's exit. The NCP emphasizes that ICs are meant to supplement engineering controls. ICs can include instruments such as signs that are used to minimize access to contaminated areas or areas that may pose a physical hazard. ICs and engineering controls can be used to accomplish various remedial objectives and could be

implemented in a series during this remedial action to provide protectiveness of human health and the environment.

The following ICs would be implemented at the Site for ten years under Alternative 3:

- ICs, in the form of a land-use restriction or notice as to the environmental conditions of the property, would be required that provides restrictions on or notification of the modifications to the existing Siphon under Alternative 3 (i.e., sliplining the Siphon) and which would protect the integrity of the remedy under Alternative 3. The IC would consist of either a restrictive covenant or a deed notice. The requirements for filing land use restrictions in the State of Texas are specified in "30 Texas Administrative Code Chapter 350 Subchapter F." A restrictive covenant, or deed notice, is an instrument filed in the real property records of the county where the affected property is located.
- Signs would be required which warn anglers of the risks associated with the consumption of fish from the Site.
- The existing Aquatic Life Order Number 9, issued by the TDH (predecessor of the TDSHS), would need to remain in place until fish tissue levels are safe for human consumption. Knowledge of the order would be enhanced with additional community outreach to encourage greater awareness of the prohibitions concerning the taking of all fish species from the Site until the concentrations of Total PCBs in fish tissue reach protective concentrations corresponding to the RGs specified in the ROD.

Public Outreach and Education

Alternative 3 would include a public outreach and educational program. To be successful, this program would rely on partnerships with state (i.e., TDSHS, TPWD, and others), city (i.e., Cities of Donna and Alamo, and other cities), and local entities (i.e., Irrigation District, Hidalgo County [Precincts 1 and 2], and other counties), as well as community-based organizations, to develop activities and measures to reduce the public's exposure to fish from the Site. Following are outreach and educational activities and programs that could be considered for implementation at the Site:

- Warnings in English and Spanish printed on water or other utility bills, received by the public, concerning consumption of fish from the Site. These bills are expected to reach a large portion of the nearby communities such as every residence and business in Donna and Alamo, Texas.
- Support from community-based organizations such as non-governmental organizations (NGOs), media, and community relations specialists to inform people about the risk of consuming contaminated fish.
- Partnering with health fairs, community fairs, and state/local health departments to provide educational materials and training in multiple languages.

- Distribution of specific outreach materials and messages focused on women of child-bearing age who consume fish as a part of their diet.
- Conduct outreach, in coordination with the TDSHS, to commercial fish market owners to inform them about the risks of buying fish from unlicensed vendors.
- Inform anglers about the contaminated fish at the Site and the TDSHS' enforceable Aquatic Life Order Number 9 which prohibits the taking of all species of aquatic life from the Site.
- Coordinate enforcement efforts, of the TDSHS' Aquatic Life Order Number 9, with the TPWD and appropriate law enforcement officials by notifying the appropriate authorities of individuals accessing the Irrigation District's private property.
- Reducing the potential risks posed by consumption of contaminated fish from the Site by coordinating with the local communities to identify an alternate fishing location(s) near the Site, routinely stock this nearby lake/reservoir, and advertise the alternate fishing location.

Five-Year Reviews

Pursuant to CERCLA Section 121(c), 42 U.S.C. § 9621(a), Alternative 3 would require statutory Five-Year Reviews since contaminants (i.e., PCBs) would be left on-Site above levels that permit unrestricted use and unlimited exposure. Although the EPA routinely evaluates the remedy, a formal review would occur every five years in the form of a Five-Year Review Report where the EPA would evaluate the performance of the remedy (i.e., protectiveness of human health and the environment, and effectiveness of the ICs).

2.9.4 *Alternative 6 (Selected Remedy): Replace Siphon, Canal Dredging, and Fish Removals*

Estimated Time for Design/Construction:	*14 Months (Design), 9 Months (Construction)*
Estimated Time to Reach Remediation Goals:	*After Construction is Complete (Sediment), 10 Years (Fish)*
Estimated Capital Costs:	*$18,710,000*
Estimated Lifetime O&M Costs:	*$700,000*
Estimated Total Present Worth Costs:	*$19,400,000*[3]
Discount Rate:	*7%*
Number of Years Costs are Projected:	*10 Years*

Alternative 6 (i.e., the Selected Remedy) includes replacing the existing Siphon, dredging/excavating sediment with Total PCB concentrations greater than 0.043 mg/kg downstream of the Siphon's exit, annual fish removals, fish tissue monitoring,

[3] The costs associated with the acquisition of land for the location of the replacement siphon or the negotiation of land easements are not included in these cost estimates.

community involvement activities for ten years, maintenance of engineering controls, and ICs.

Replacement of the Existing Siphon

Replacement of the existing Siphon involves the construction of a new siphon to replace the existing one and sealing (i.e., grouting in place) the existing Siphon. Because the Irrigation District's canal system can only be inoperable for short periods of time, a new siphon will be constructed adjacent to the existing one. The profile of the new siphon will roughly follow the profile of the existing Siphon, which is displayed in Figure 3 (Existing Siphon Plan, Profile, and Sections). The possible location for the replacement siphon is included in Figure 26 (Siphon Replacement). The greatest challenges to the installation occurs where the new siphon intersects the Arroyo Colorado River and land acquisition for the siphon. The river would have to be temporarily diverted (e.g., cofferdams, dewatering pumps, etc.) to allow for construction to be completed in an area adjacent to the existing Siphon. This diversion would require coordination with Hidalgo County and the IBWC. The area will be prepared for construction activities (i.e., surveyed, cleared of brush, etc.) prior to the installation of the new siphon.

The new siphon will be built using 108-inch inner diameter pre-stressed concrete pipe placed in a trench 15 to 20 feet below the surface of the ground. The Arroyo Colorado River will be temporarily diverted with cofferdams and dewatering pumps to allow for construction to be completed in this area.

In addition to a new siphon, approximately 200 feet of the north end of the Main Canal and 400 feet of the south end of the Lower West Main Canal Unlined will require modification to connect to the new siphon. The new canal segments will contain concrete lining and transition to the new siphon's entrance and from the new siphon's exit. A component of the Selected Remedy will require the construction of a new flow control gate (i.e., weir) near the entrance of the siphon (Figure 26 – Siphon Replacement) to control water flow into the new siphon because the existing weir would no longer be in alignment with the canal system.

Once siphon construction and canal modifications are complete, water can then be diverted into the new siphon and the existing Siphon will be dewatered and completely sealed (i.e., grouted in place) to prevent exposure to human and ecological receptors. Fish in the existing Siphon at the time of dewatering will be removed and properly disposed of. Grout will be injected from both ends of the existing Siphon with a possibility of injection from above the alignment. The grout will have a permeability of no more than 1×10^{-6} centimeters/second.

The implementation of the Selected Remedy assumes no shutdown of the Irrigation District's operation (i.e., supplying water for drinking and agricultural irrigation purposes) is necessary to complete the work. Cofferdams will be installed around the canal modification areas and a series of pumps will be used to bypass the construction area. Cost savings may be achieved if temporary shutdown of the Irrigation District's operation is possible during the construction of the new siphon.

Post siphon replacement activities will include backfilling, grading, and planting native vegetation at the temporary access points used to abandon the existing Siphon. The entire construction phase of this remedy component is estimated to take four months to complete.

The costs for the purchase of land or to negotiate land easements for the location of the replacement siphon is not included in the cost estimate from the FS.

Canal Dredging

The area of remediation, under the Selected Remedy, required to meet the sediment CUL of 0.043 mg/kg Total PCBs spans the width of the Lower West Main Canal Unlined approximately 4,500 feet beyond the Siphon's exit (i.e., an area approximately 55 feet wide by 4,500 feet in length) as shown in Figure 25 (Sediment Remediation Area Based on a Sediment Cleanup Goal of 0.043 mg/kg). Approximately 20 inches of sediment will be mechanically dredged/excavated from the canal using clamshell excavation methods or similar equipment. A volume of approximately 20,000 cubic yards of sediment will be excavated from the canal, which accounts for approximately 6 inches of operator error during the removal.

During the dredging/excavation of canal sediment, a temporary bridge will be installed adjacent to the existing bridge downstream of the Siphon's exit to allow the agricultural equipment and vehicles to cross the canal during the remedial action. During the remediation of the area, the bridge may be left in place without complicating the remedy. To prevent migration of contamination into the water column and downstream during dredging activities, silt curtains will be installed to capture the disturbed sediment. Excavation of the sediment during low water conditions may not require the use of silt curtains. Contaminated material will be partially dewatered on the Site using a series of watertight rolloffs and fractionation tanks, and the sediment will be stabilized and transported to an approved off-site disposal facility. The sediment will be sampled prior to disposal to ensure compliance with waste disposal requirements. Prior to the restoration of the remediation area, confirmation samples will be collected as necessary to ensure that the remediation satisfies the RAOs for the Site. During remedial action construction, the levees will be stabilized using imported material to protect against construction activity and erosion that may occur.

The estimated construction time for this remedy component is five months, and at no time during these activities will the canal system require shutdown.

Fish Removals

Fish removals will be performed on an annual basis for five years to reduce the exposure pathway to human receptors by removing fish from the reservoir and canal system possibly contaminated with PCBs and which are available for human consumption. The EPA will consider additional fish removal efforts after the five-year period to determine if additional fish removals should be performed based on whether the RG for Total PCBs in fish tissue is being met. These fish removals will aid in

meeting the RAOs for fish tissue and will enhance the effectiveness of the Selected Remedy by achieving the RGs for fish tissue concentration levels, especially in the larger fish which bioaccumulate greater concentrations of PCBs through the food chain.

All areas of the Site will be considered when determining where to conduct fish removals. Fish removals will be accomplished using electrofishing/electroshocking methods. During periods where low water conditions exist at the Site, fish accumulate in certain areas and could be removed using seine netting or other applicable methods. Coordination with the Irrigation District will be required to anticipate low water conditions and plan the fish removals. The fish will be collected in drums and disposed of at an off-site disposal facility. Other fish removal methods (e.g., hoop, fyke, and pound nets, etc.) could be used to supplement the removal efforts.

Fish Tissue Monitoring

Monitoring of fish tissue concentrations will be performed to evaluate potential risks to human health and attainment of the RG for fish tissue. Although the types, number, and locations of fish to be collected during performance monitoring will be determined during the remedial design of the Selected Remedy, bottom feeders and predatory fish could be collected from each of the following five established fish collection areas:

- Main Canal – Near the Rio Grande Pump Station.
- Main Canal – Near the weir and the Siphon's entrance.
- Lower West Main Canal Unlined – Near the Siphon's exit.
- Lower West Main Canal Unlined – Near the bridge at FM 1493.
- West Reservoir.

Actual sampling will be determined during the remedial design phase of the Selected Remedy; however, targeted fish could be a minimum of 8 inches in length and processed into fillets in the field or by the laboratory for the analysis of Total PCBs. Collection efforts could focus on the primary targeted species identified in the following table; however, secondary targeted species could be collected if primary targeted species are not available.

<u>Predator Species</u>

- Primary
  - Largemouth Bass
- Secondary
  - Smallmouth Bass
  - Alligator Gar

<u>Bottom Feeder Species</u>

- Primary
  - Smallmouth Buffalo
- Secondary
  - Common Carp
  - Channel Catfish

Sediment Sampling

Sediment sampling of the canal system will be performed to evaluate the performance of the remedy. The frequency of the sampling will be determined during the remedial

design of the remedy. Sediment samples collected from the canal system will be analyzed for Total PCBs.

Performance Monitoring

The Selected Remedy includes performance monitoring to evaluate whether the RAOs for the Site are being met. Performance monitoring will also be conducted to ensure that the remedy remains protective of human health and the environment. After the completion of the remedy, protectiveness of the Selected Remedy will be evaluated during the Five-Year Reviews required by CERCLA for the Site.

Performance monitoring will occur for a period of time beginning with the collection of baseline data. Monitoring will include performance standards related to remedy implementation and will be developed during the remedial design of the remedy described in the ROD. These performance standards which will be incorporated into design documents will promote accountability and ensure that the remedy meets the RAOs stated in the ROD.

Institutional Controls

The Selected Remedy will continue and/or enhance the ICs for the Site. ICs are non-engineering instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contaminants and/or protect the integrity of a response action by limiting land or resource use. ICs also provide information and notification to interested persons and communities about any residual contamination left at a site and any restrictions because of the remaining contamination. ICs typically are used in conjunction with engineering controls or measures. The engineering controls considered at this Site, under the Selected Remedy, include: 1) Replacement of the existing Siphon (i.e., the likely source of the PCBs), and 2) Removal and disposal of the PCB-contaminated sediment located hydraulically downstream from the existing Siphon's exit. The NCP emphasizes that ICs are meant to supplement engineering controls. ICs can include instruments such as signs that are used to minimize access to contaminated areas or areas that may pose a physical hazard. ICs and engineering controls can be used to accomplish various remedial objectives and could be implemented in a series during this remedial action to provide protectiveness of human health and the environment.

The following ICs will be implemented at the Site for ten years under the Selected Remedy:

- ICs, in the form of a land-use restriction or notice as to the environmental conditions of the property, will be required that provides restrictions on or notification of the modifications to the existing Siphon under Alternative 6 (i.e., grouting of the existing Siphon) and which will protect the integrity of the Selected Remedy. The IC would consist of either a restrictive covenant or a deed notice. The requirements for filing land use restrictions in the State of Texas are specified in "30 Texas Administrative Code Chapter 350 Subchapter F." A

restrictive covenant, or deed notice, is an instrument filed in the real property records of the county where the affected property is located.

- Signs will be required which warn anglers of the risks associated with the consumption of fish from the Site.
- The existing Aquatic Life Order Number 9, issued by the TDH (predecessor of the TDSHS), will need to remain in place until fish tissue levels are safe for human consumption. Knowledge of the order will be enhanced with additional community outreach to encourage greater awareness of the prohibitions concerning the taking of all fish species from the Site until the concentrations of PCBs in fish tissue reach protective concentrations corresponding to the RGs specified in the ROD.

Public Outreach and Education

The Selected Remedy will include a public outreach and educational program. To be successful, this program will rely on partnerships with state (i.e., TDSHS, TPWD, and others), city (i.e., Cities of Donna and Alamo, and other cities), and local entities (i.e., Irrigation District, Hidalgo County [Precincts 1 and 2], and other counties), as well as community-based organizations, to develop activities and measures to reduce the public's exposure to fish from the Site. Following are outreach and educational activities and programs that could be considered for implementation at the Site:

- Warnings in English and Spanish printed on water or other utility bills, received by the public, concerning consumption of fish from the Site. These bills are expected to reach a large portion of the nearby communities such as every residence and business in Donna and Alamo, Texas.
- Support from community-based organizations such as non-governmental organizations (NGOs), media, and community relations specialists to inform people about the risk of consuming contaminated fish.
- Partnering with health fairs, community fairs, and state/local health departments to provide educational materials and training in multiple languages.
- Distribution of specific outreach materials and messages focused on women of child-bearing age who consume fish as a part of their diet.
- Conduct outreach, in coordination with the TDSHS, to commercial fish market owners to inform them about the risks of buying fish from unlicensed vendors.
- Inform anglers about the contaminated fish at the Site and the TDSHS' enforceable Aquatic Life Order Number 9 which prohibits the taking of all species of aquatic life from the Site.
- Coordinate enforcement efforts, of the TDSHS' Aquatic Life Order Number 9, with the TPWD and appropriate law enforcement officials by notifying the appropriate authorities of individuals accessing the Irrigation District's private property.

- Reducing the potential risks posed by consumption of contaminated fish from the Site by coordinating with the local communities to identify an alternate fishing location(s) near the Site, routinely stock this nearby lake/reservoir, and advertise the alternate fishing location.

Five-Year Reviews

Pursuant to CERCLA Section 121(c), 42 U.S.C. § 9621(a), the Selected Remedy will require statutory Five-Year Reviews since contaminants (i.e., PCBs) will be left on-Site above levels that permit unrestricted use and unlimited exposure. Although the EPA routinely evaluates the remedy, a formal review will occur every five years in the form of a Five-Year Review Report where the EPA will evaluate the performance of the remedy (i.e., protectiveness of human health and the environment, and effectiveness of the ICs).

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP, 40 CFR § 300.430(e)(9)(iii), requires the consideration of nine criteria to evaluate the different remedial alternatives individually and in comparison to each other. The two threshold criteria which are requirements that each alternative must meet to be eligible for the selection as a final remedy, are: 1) overall protection of human health and the environment, and 2) compliance with "applicable or relevant and appropriate requirements" (ARARs). The five primary balancing criteria which are used to weigh major trade-offs among alternatives are: 3) long-term effectiveness and permanence; 4) reduction of toxicity, mobility or volume through treatment; 5) short-term effectiveness; 6) implementability; and 7) cost. The two modifying criteria are: 8) state acceptance, and 9) community acceptance. The EPA assesses public comments on the Proposed Plan to gauge community acceptance and has responded to each public comment received, during the public comment period, in Part 3 (Responsiveness Summary) of this ROD.

CERCLA Section 121(b), 42 U.S.C. § 9621(b), and 40 CFR 300.430(f)(ii) state that remedial actions must accomplish the following:

- Be protective of human health and the environment;
- Attain ARARs or provide grounds for invoking a waiver;
- Be cost effective;
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
- Satisfy the preference for treatment that reduces toxicity, mobility, and volume as a principal element or explain why it does not meet this criterion.

The following sections of this ROD discuss the relative performance of each alternative against the NCP's nine criteria and the EPA's rationale for the selection of Alternative 6 (Replace Siphon, Canal Dredging/Excavation, and Fish Removals) as the Selected

Remedy for the Site. The FS, included in the Administrative Record file for the Site, contains a detailed analysis of each alternative against the NCP's nine criteria and a comparative analysis of how the alternatives compare to each other.

2.10.1 *Threshold Criteria*

Overall Protection of Human Health and the Environment

This criterion addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or ICs. This criterion is considered a threshold and must be met by the selected alternative.

Alternative 1, the NFA Alternative, ranks lowest, in the evaluation criterion for "Overall Protection of Human Health and the Environment," followed by Alternative 2 (Limited Action). Alternative 1 takes no measures to protect human health and the environment. The existing Siphon would continue to act as the primary source of contamination which poses an unacceptable risk to human health and ecological receptors. The fish would continue to pose an unacceptable risk to human receptors and ecological receptors would continue to be exposed to contaminated sediment in the canal system.

The implementation of Alternative 2 would do little to minimize the unacceptable risk to human health and takes no action in protecting the environment. Engineering controls in the form of signs and community involvement would only warn the public of the risks of fish consumption and may not be effective. There is a low overall protection to human health and no protection to the environment for Alternative 2. Under Alternatives 1 and 2, the existing Siphon would continue to act as the primary likely source of contamination which poses an unacceptable risk to human health and ecological receptors. Fish would continue to pose an unacceptable risk to human receptors and ecological receptors would continue to be exposed to contaminated sediment in the canal system. No efforts would be made to remove contaminated fish from the reservoir and canal system under Alternatives 1 and 2.

Alternatives 3 and 6 would provide the highest level of overall protection to human health and the environment because the sediment contamination above the CUL will be actively addressed during the remedial action. Sliplining the Siphon, under Alternative 3, would act as a barrier between the likely source of contamination and migration pathways into the reservoir and canal system. Replacing the Siphon, under Alternative 6, will eliminate the migration pathway from the likely source by bypassing the source of contamination and the existing Siphon will be grouted in place.

Leaving the Siphon in place, under both Alternatives 3 and 6, is not anticipated to be a source of contamination to the Arroyo Colorado River based on analytical data collected during the RI. Soil and sediment samples collected from the Arroyo Colorado River and adjacent to the river indicate that Aroclor-1260 and Total PCB Congener concentrations upgradient of the Siphon are higher than those downgradient of the Siphon, which

suggests that the Siphon is not a source of PCBs to the Arroyo Colorado River. Aroclor-1254 was not detected in any of the soil or sediment samples from the Arroyo Colorado River. PCBs are hydrophobic and tend to bind to sediment; therefore, the Siphon's construction materials are not anticipated to migrate into ground water. Ground water monitor wells were installed during the RI and samples were collected to evaluate PCBs in ground water and no unacceptable risk was found.

The canal sediment would be dredged, under Alternatives 3 and 6, to remove sediment concentrations above 0.043 mg/kg Total PCBs. Figure 4 (Sediment Remediation Area) depicts the sediment remediation area under Alternatives 3 and 6. Reductions in fish tissue and mollusk PCB concentrations will occur naturally once the sources of contamination are contained (i.e., sliplining or replacement of the Siphon under Alternative 3 and 6, respectively) or removed (i.e., dredging of sediment). Dredging of the canal sediments will reduce the risk to humans, piscivorous birds and mammals, aquatic carnivorous mammals, and benthic invertebrates. While reductions in fish tissue will occur naturally, annual fish removals, under Alternatives 3 and 6, would reduce unacceptable risk to human receptors faster than if no fish removals were to occur. The reservoir and canal system is essentially a closed system (i.e., water flows from the Rio Grande River and unused water flows out at the Donna Drain), and the active physical removal of fish from the reservoir and canal system will significantly aid in meeting the RAOs for the Site.

Under Alternatives 3 and 6, an analysis of the PCB concentrations in remaining sediment in the canal system, after removal of the sediment locations that exceed a CUL of 0.043 mg/kg Total PCBs, results in an overall 95% UCL of 0.00276 mg/kg Total PCBs in sediment. This concentration is below the calculated sediment CUL based on: 1) a 10^{-5} adult recreational fisher cancer risk level (i.e., 0.004 mg/kg), and 2) an Aroclor-1254 child recreational fisher non-cancer HI of 1 (i.e., 0.003 mg/kg). Therefore, removal of sediment greater than 0.043 mg/kg Total PCBs should result in fish tissue concentrations that will be protective of recreational fishers below a 10^{-5} cancer risk level and an Aroclor-1254 non-cancer HI of 1.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), and 40 CFR § 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations that are collectively referred to as ARARs, unless such ARARs are waived pursuant to CERCLA Section 121(d)(4), 42 U.S.C. § 9621(d)(4). This criterion is considered a threshold and must be met by the selected alternative.

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated pursuant to federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may

be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated pursuant to federal environmental or state environmental or facility siting laws that while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be relevant and appropriate. Section 2.13.2 (Compliance with Applicable or Relevant and Appropriate Requirements) and Appendix D (Determination of Applicable or Relevant and Appropriate Requirements) of this ROD include the ARARs for the Site.

Compliance with ARARs addresses whether a remedy will meet all the applicable or relevant and appropriate requirements of other federal and state environmental statues or provides a basis for invoking a waiver.

Alternatives 1 and 2 would not meet the threshold criteria of protection of human health and the environment and compliance with ARARs.

It is anticipated that Alternatives 3 and 6 would meet the threshold evaluation criterion of compliance with ARARs, including those related to PCBs and the Toxic Substances Control Act. Both alternatives are assumed to comply with the location- and action-specific ARARs because the required engineering design and agency review process can ensure that the selected remedy complies with the applicable ARARs. Both alternatives can be designed and implemented in compliance with ARARs pertaining to the management and disposal of generated materials (i.e., sediment and fish). Furthermore, the remedial design phase of the remedy can address the various land use and resource protection ARAR requirements (e.g., habitat preservation and mitigation).

2.10.2 *Balancing Criteria*

Long-Term Effectiveness and Permanence

This criterion refers to the expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion is used to weigh major trade-offs among alternatives.

Alternative 1 ranks lowest in the evaluation criterion for "Long-term Effectiveness and Permanence," followed by Alternative 2. These alternatives do not provide long-term effectiveness since there is no active remediation of the PCBs at the Site. The likely source of contamination (i.e., the Siphon) would continue to deposit PCBs in the downstream sediment until the contaminants in the source material are completely depleted. The PCBs would continue to bioaccumulate and biomagnify through the food chain. Under Alternative 2, it is possible that the ICs, engineering controls, and community involvement activities will not be successful at preventing the consumption

of fish collected from the reservoir and canal system; therefore, the effectiveness for this alternative is questionable.

Alternatives 3 and 6 provide long-term effectiveness and permanence because contaminated sediment would be removed from the Site. Additionally, sliplining the Siphon, under Alternative 3, or replacing the Siphon, under Alternative 6, mitigate the transport pathway to human and ecological receptors from the likely PCB source into the Site, in the long-term, and are permanent source removal remedies. However, Alternative 6 provides a higher level of long-term effectiveness and permanence than Alternative 3 because the existing Siphon, during or after sliplining under Alternative 3, could lose structural stability due to the age of the structure. The Siphon was constructed in approximately 1926 and is probably approaching the end of its design life. While sliplining will extend the life of the Siphon, the Siphon must withstand the dewatering, uncovering, and slipline installation. It is possible that the concrete and steel may have degraded over time and will not withstand the process. If the Siphon were to collapse or fail during the sliplining process or after remediation, another alternative may have to be implemented. Under Alternative 6 a new structure would be required.

Removal of the PCB-contaminated sediment downstream of the Siphon's exit will reduce sediment PCB concentrations to below the CUL under both alternatives. Additionally, annual fish removals would eliminate residual contamination from the system. Removal of contaminated sediment and mitigating the likely source of the PCBs into the Site will also be protective of ecological receptors under both alternatives.

Reduction of Toxicity, Mobility, or Volume through Treatment

This criterion refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. *This criterion is used to weigh major trade-offs among alternatives.*

The NCP, at 40 C.F.R § 300.430(a)(1)(iii)(A), establishes a preference for the use of treatment to address the principal threats posed by a site wherever practicable. The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water, or air; or acts as a source for direct exposure. Principal threat wastes are those materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Low-level threat wastes are those materials that generally can be reliably contained and that would present only a low risk in the event of exposure.

The source material at the Site is found in the existing Siphon and the contaminated sediment located downstream of the Siphon's exit. The source material is not highly toxic or highly mobile and thus is low-level waste and not principal threat waste.

The HHRA (EA 2016b) determined that there were no unacceptable human health concerns for direct contact with sediment containing PCBs. The carcinogenic risks for the adult, adolescent, and child recreational users are 1×10^{-7}, respectively, which are all below the lower end of the EPA's target risk range (i.e., 1×10^{-6}). The total non-carcinogenic HIs for the adult, adolescent, and child recreational users are 0.008, 0.03, and 0.05, respectively, which are all below the EPA's acceptable threshold (i.e., 1.0).

Also, PCBs are hydrophobic, which means that they tend to bind to sediment particles, organic matter in sediment, and fatty tissues in biota (EA 2016b). Suspended sediment in water at the Site tends to settle out onto the bottom of the canal system immediately downgradient of the existing Siphon's exit due to low water velocities with distance from the exit. The RI (EA 2016a) determined that the highest concentrations of PCBs were found immediately downgradient of the existing Siphon's exit. As a result, contaminated sediment is effectively contained within the reservoir and canal system and is not considered a highly mobile source material.

Additionally, it is likely that the Siphon's construction/repair materials (e.g., concrete, caulking, grout, or sealants) were a primary source of contamination at the Site. The RI (EA 2016a) determined that the concentrations of PCBs in the surface water taken from within the existing Siphon and analyzed for Total PCB Congeners ranged from 190 to 1,700 picograms/liter (pg/L). These concentrations are well below the federal surface water quality criteria for aquatic life (i.e., 14,000 pg/L) and the Total PCB maximum contaminant level for drinking water (i.e., 500,000 pg/L).

Alternatives 1 and 2 do not provide any reduction in toxicity, mobility, or volume through treatment, and are therefore ranked the lowest of all alternatives. Although none of the alternatives include treatment technologies, Alternatives 3 and 6 will further reduce the mobility of contaminants at the Site because once the contaminated sediment is excavated and the Siphon sliplined or replaced, PCBs will not be able to leach into the surface water. Alternatives 3 and 6 will also reduce the volume of contaminated sediment by dredging/excavating the contaminated sediment downgradient of the Siphon's exit.

Short-Term Effectiveness

This criterion addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved. *This criterion is used to weigh major trade-offs among alternatives.*

No activity is performed under Alternative 1, the NFA Alternative; therefore, it poses no additional short-term impacts to the community. Alternative 2 provides minimal or low short-term impacts to the community in terms of the carbon footprint associated with ICs and community involvement activities implemented at the Site (i.e., activities associated with the installation of signs and travel for the community involvement representatives).

The community could be affected by an increase in traffic caused by the transportation of equipment and materials under Alternatives 3 and 6. The local agricultural industry may be affected by limited road access near remedial action construction areas. A temporary bridge to facilitate agricultural traffic over the canal during remedial activities will be constructed; however, access to fields located directly adjacent to the canal segments at the Siphon's entrance and exit may be impeded. Additionally, dust may be produced during construction and transportation activities, but can be mitigated through standard construction practices. Environmental impacts associated with construction around the new or existing Siphon include the effects of diverting and dewatering the Arroyo Colorado River and the Siphon. Environmental impacts associated with the dredging/excavation of sediment from the canal and fish removals include reducing the population of benthic organisms and fish. Although silt curtains would be used, if needed, dredging/excavating the canal would also disturb sediment which could increase exposure to downstream ecological receptors. Additionally, air emissions from heavy equipment and vehicles would possibly negatively impact the environment.

A factor to consider when evaluating short-term effectiveness is the length of time it would take to perform the construction activities. The construction time has a direct correlation to risks associated with construction and transportation activities as well as the carbon footprint. Alternative 6 is ranked the lowest because it requires an estimated nine months to construct, while Alternative 3 requires an estimated seven months.

Implementability

This criterion considers the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as the relative availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered. This criterion is used to weigh major trade-offs among alternatives.

The implementability evaluation criterion ranks the highest when complication from construction is the lowest. Implementability is not applicable to Alternative 1 since no action would be taken. Alternative 2 has the highest implementability, compared to Alternatives 3 and 6, due to the absence of a construction component; however, this alternative is not protective of human health and the environment (i.e., a threshold criteria).

Alternative 3 includes complexities associated with the structural integrity and the age of the Siphon. The Siphon was constructed in approximately 1926 and is probably approaching the end of its design life. While sliplining will extend the life of the Siphon, the Siphon must withstand the remedial action components of dewatering, uncovering, and slipline installation. It is possible that the concrete and steel used to construct the Siphon may have degraded over time and will not withstand the sliplining or remediation process. If the Siphon were to collapse or fail during the sliplining process or after remediation, another alternative may have to be implemented. Under Alternative 6, a new siphon would be required. Considering the complexities associated with the

structural integrity and the age of the Siphon, Alternative 6 would rank higher than Alternative 3 under this implementability criteria.

Additionally, Alternative 3 includes other complexities associated with the installation of the slipline such as obtaining the proper alignment within the existing Siphon and completely filling the void space with grout. Under Alternative 6, a new siphon would be required. Considering the complexities associated with the installation of the slipline, Alternative 6 would rank higher than Alternative 3 under this implementability criteria.

Considering the construction complexities associated the potential acquisition of land and the potential negotiation of land easements, Alternative 3 ranks higher than Alternative 6 because implementation of the slipline remedy would not require the potential acquisition of land or the negotiation of easements.

The feasibility of implementing Alternatives 3 and 6 is dependent on which season construction takes place. Under Alternative 3, during periods of high water demand, sliplining may be more difficult to implement because water would be pumped at a higher flowrate to bypass the existing Siphon. Under Alternative 6, during periods of high water demand, construction may be more difficult when installing the new weir and transitioning water flow into the new siphon. Under both alternatives, a higher flowrate in the canal would also result in an increase in the level of suspended sediment when the material is disturbed during dredging.

Under Alternatives 3 and 6, implementing the fish removals is feasible because this field activity in these areas have been previously performed, and equipment and specialists are available for these activities.

The administrative feasibility to construct the remedy, implement the monitoring requirements, access the equipment and specialists, and coordinate with the appropriate regulatory agencies are the same for Alternatives 3 and 6. Both alternatives would require coordination with numerous governmental entities who may have control or ownership over the construction area, especially during the implementation of sliplining the existing Siphon or the installation of a new siphon. Specifically, these activities would have to be coordinated with the IBWC or other entities that may have jurisdiction of the levees or the area located at the entrance and near the exit of the existing Siphon, including the location for the new siphon.

Costs

This criterion includes estimated capital and operation and maintenance costs as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent. The selection of a remedial alternative is not solely based on cost; however, cost may be used to select between alternatives that perform favorably when comparing the other criteria. This criterion is used to weigh major trade-offs among alternatives.

The estimated present worth costs for the Selected Remedy are included in Appendix C (Costs, Replace Siphon and Dredging of Canal Sediment with Off-Site Disposal), which provides the detailed cost estimate for the implementation of the remedial action. These costs are divided into Siphon replacement and sediment dredging costs. The costs for land purchase or to negotiate land easements have not been included in Alternative 6, but may be necessary.

The estimated present worth costs for the alternatives considered in the FS range from $0 for Alternative 1 to $19.4 million for Alternative 6. The costs for each alternative are presented in the following table:

Summary of Remedial Alternative Costs

Alternative 1 No Further Action	Alternative 2 Limited Action	Alternative 3 Slipline Siphon, Canal Dredging, and Fish Removals	Alternative 6 Replace Siphon, Canal Dredging, and Fish Removals
Cost			
$0	$1.6 Million	$15.6 Million	$19.4 Million

2.10.3 *Modifying Criteria*

State/Support Agency Acceptance

This criterion considers whether the State agrees with the EPA's analyses and recommendations of the RI/FS and the Proposed Plan. In the final balancing of trade-offs between alternatives upon which the final remedy selection is based, modifying criteria are of equal importance to the balancing criteria.

The State of Texas, represented by the TCEQ, was provided the opportunity to review and comment on the Selected Remedy and agrees with the EPA's Selected Remedy (Alternative 6 – Replace Siphon, Dredge Sediments, and Fish Removals).

Community Acceptance

This criterion considers whether the local community agrees with the EPA's analyses and the Preferred Alternative of the Proposed Plan. Any comments received on the Proposed Plan are an important indicator of community acceptance. In the final balancing of trade-offs between alternatives upon which the final remedy selection is based, modifying criteria are of equal importance to the balancing criteria.

The EPA conducted two public meetings on May 22, 2018, in Alamo and Donna, Texas, to present the Proposed Plan and the EPA's Preferred Alternative 6 (Replace Siphon, Canal Dredging, and Fish Removals) to the public and to solicit the public's comments. Based upon the oral and written comments received during the public meetings and during the public comment period for the Proposed Plan, the community did not oppose the EPA's Selected Remedy (i.e., Alternative 6) described in this ROD.

The EPA periodically met with local, county, and state/federal public officials (i.e., Mayors and City Managers for the Cities of Donna and Alamo, Hidalgo County representatives, Texas Secretary of State representatives, TCEQ, USFWS, IBWC, and other public officials), including several community-based organizations (i.e., non-governmental organizations or others) and representatives from the Irrigation District during the implementation of the RI and fish removal actions. These meetings helped the EPA to become better aware of the issues and concerns held by the local officials and the public and in preparing this ROD.

The EPA assesses the public's comments on the Proposed Plan to gauge community acceptance of the EPA's Preferred Alternative 6 and has responded to each public comment received in Part 3 (Responsiveness Summary) of this ROD.

2.11 PRINCIPAL THREAT WASTES

The NCP, at 40 C.F.R § 300.430(a)(1)(iii)(A), establishes a preference for the use of treatment to address the principal threats posed by a site wherever practicable. The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water, or air; or acts as a source for direct exposure. Principal threat wastes are those materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Low-level threat wastes are those materials that generally can be reliably contained and that would present only a low risk in the event of exposure.

The source material at the Site is found in the existing Siphon and the contaminated sediment located downstream of the Siphon's exit. The Siphon and the contaminated sediment are not highly toxic or highly mobile, and thus are low-level waste and not principal threat waste.

The HHRA (EA 2016b) determined that there were no unacceptable human health concerns for direct contact with sediment containing PCBs. The carcinogenic risks for the adult, adolescent, and child recreational users are 1×10^{-7}, respectively, which are all below the lower end of the EPA's target risk range (i.e., 1×10^{-6}). The total non-carcinogenic HIs for the adult, adolescent, and child recreational users are 0.008, 0.03, and 0.05, respectively, which are all below the EPA's acceptable threshold (i.e., 1.0).

Also, PCBs are hydrophobic, which means that they tend to bind to sediment particles, organic matter in sediment, and fatty tissues in biota (EA 2016b). Suspended sediment in water at the Site tends to settle out onto the bottom of the canal system immediately downgradient of the existing Siphon's exit due to low water velocities with distance from the exit. The RI (EA 2016a) determined that the highest concentrations of PCBs were found immediately downgradient of the existing Siphon's exit. As a result, contaminated sediment is effectively contained within the reservoir and canal system and is not considered a highly mobile source material.

Additionally, it is likely that the Siphon's construction/repair materials (e.g., concrete, caulking, grout, or sealants) were a primary source of contamination at the Site. The RI (EA 2016a) determined that the concentrations of PCBs in the surface water taken from within the existing Siphon and analyzed for Total PCB Congeners ranged from 190 to 1,700 picograms/liter (pg/L). These concentrations are well below the federal surface water quality criteria for aquatic life (i.e., 14,000 pg/L) and the Total PCB maximum contaminant level for drinking water (i.e., 500,000 pg/L).

2.12 SELECTED REMEDY

Based on the consideration of the requirements of CERCLA, the detailed analysis of remedial alternatives, consultations with the TCEQ, and the consideration of the public's comments, the EPA has selected Alternative 6 (Replace Siphon, Dredge Canals, and Fish Removals) as the Selected Remedy for the Site. This section of the ROD provides the EPA's rationale for the selection of the Selected Remedy, including a description of its anticipated scope, how the remedy will be implemented, and its expected outcomes.

2.12.1 *Summary of the Rationale for the Selected Remedy*

The Selected Remedy is protective of human health and the environment, complies with ARARs, and provides the best balance of tradeoffs among the balancing criteria. It reduces risks within a reasonable time frame, provides for long-term reliability of the remedy, and minimizes reliance on ICs. It will achieve substantial risk reduction by mitigating the transport pathway between the existing Siphon and the reservoir and canal system and by removing the most contaminated sediment downstream of the Siphon's exit. Removal of the contaminated sediment to concentrations below the CUL will reduce the fish tissue concentrations to below the RG which is protective of human receptors and will also be protective of ecological receptors. Human health risks will significantly be reduced through the fish removals, ICs, and the implementation of a community involvement program.

2.12.2 *Description of the Selected Remedy*

The Selected Remedy is considered a final remedial action for the Site and addresses the following source of contaminants, receptors, and Site media:

- The likely source of PCB contamination at the Site (i.e., the Siphon),
- Site-related human health risks associated with consumption of fish, and
- Site-related ecological risks from contaminated sediment.

The Selected Remedy includes the following major components:

- Removal of approximately 20,000 cubic yards of sediment exceeding the CUL of 0.043 mg/kg Total PCBs, located in the canal approximately 4,500 feet downstream of the Siphon's exit, and transportation to an off-site disposal facility;

- Replacement (i.e., construction of a new siphon) and abandonment of the existing Siphon (i.e., grouting in place);
- Removal of fish annually for five years from all sections of the Site (additional fish removals will be considered based on the attainment of the fish tissue RG);
- Post remediation Site monitoring that includes:
    - Frequency of fish tissue monitoring and sediment sampling of the canal system will be determined during the remedial design of the Selected Remedy;
- Implementation of a public outreach program for ten years to inform the community of the potential health risks associated with consuming fish from the Site;
- Installation and maintenance of signs at the Site for ten years to warn people of the risks associated with consuming fish from the Site;
- Coordination with the TDSHS to maintain the Aquatic Life Order Number 9 until the fish tissue concentrations have reached the fish tissue Remediation Goal of 0.031 mg/kg Total PCBs;
- Implementation of an IC(s), in the form of a land-use restriction or notice as to the environmental conditions of the property, which will protect the integrity of the Selected Remedy, and evaluation of the appropriate IC(s) in consultation with the TCEQ; and
- Performance of statutory Five-Year Reviews to evaluate the performance of the Selected Remedy.

2.12.3 *Summary of the Estimated Costs for the Selected Remedy*

The estimated present worth costs for the Selected Remedy are included in Appendix C (Costs, Replace Siphon and Dredging of Canal Sediment with Off-Site Disposal), which provides the detailed cost estimate for the implementation of the remedial action. These costs are divided into Siphon replacement and sediment dredging costs.

The information in the following cost estimate summary table for the Selected Remedy is based on the best available information regarding the anticipated scope of Alternative 6. Changes in the cost elements are likely to occur because of new information and data collected during the engineering remedial design of the Selected Remedy. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences, or a ROD Amendment. This cost estimate for the Selected Remedy is an order-of-magnitude engineering cost estimate that is expected to be within plus 50 to minus 30 percent of the actual project cost.

Cost Estimate for Alternative 6

Alternative 6: Replace Siphon, Canal Dredging, and Fish Removals			
Component	**Cost [1]**	**Details**	**Timeframe**
Replace Siphon	$8,100,000 [2]	Install new siphon adjacent to existing Siphon. Fill existing Siphon with grout and leave in place.	4 months
Dredging of Canal Sediment with Off-Site Disposal	$7,600,000 [2]	Excavate canal sediment above 0.043 mg/kg Total PCBs and transport to an off-site disposal facility.	5 months
Fish Removal	$3,000,000 [3]	Remove fish from the canal and reservoir system using electrofishing and other fish removal methods.	Annually for 5 years.
Post Remediation Site Monitoring	$410,000 [3]	Sample fish tissue for Total PCBs.	Determined during the remedial design of the Selected Remedy.
	$150,000 [3]	Sample sediment in the canal system for Total PCBs.	Determined during the remedial design of the Selected Remedy.
Community Involvement and Engineering Controls	$140,000 [3]	Implement a public outreach program that will inform the community on the potential health risks associated with consuming fish from the site. Signs will be used to warn people at the site of risks.	10 years
Institutional Controls	$0	Aquatic Life Order Number 9, maintained by TDSHS.	Until the fish tissue remediation goal has been reached.
	$0	Land-use restriction to prevent disturbance of the existing siphon.	As long as the existing Siphon remains.
Total Cost	**$19,400,000 [3]**		

Note:
[1] Costs and total are rounded
[2] Capital Cost
[3] Net Present Value (7 percent discount), this cost estimate does not include the costs to purchase land or negotiate land easements.

ARAR - Applicable or Relevant and Appropriate Requirement
PCBs – Polychlorinated Biphenyls
TDSHS – Texas Department of State Health Services

2.12.4 *Expected Outcomes of the Selected Remedy*

The intent of the Selected Remedy is to be protective of human health and the environment and to attain ARARs. It is consistent with current and reasonably anticipated future uses of the land and resources (i.e., soil, surface water, and ground water). It is also intended to minimize the reliance on ICs to the extent practicable. The Selected Remedy will eliminate the contaminant transport pathway from the likely source (i.e., the Siphon), address the highest sediment contamination at the Site, manage short-term risks, and with time reduce fish tissue concentrations at the Site to achieve long-term protectiveness to human and ecological receptors.

2.13 STATUTORY DETERMINATIONS

Pursuant to CERCLA Section 121, 42 U.S. Code §9621, and 40 CFR 300.430(f) the EPA must select remedies that are protective of human health and the environment,

comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections of this ROD discuss how the Selected Remedy meets these statutory requirements.

2.13.1 *Protection of Human Health and the Environment*

The Selected Remedy will protect human health and the environment by eliminating the contaminant transport pathway from the likely source (i.e., the Siphon) into the environment. The Selected Remedy will remove the sediment with the highest concentrations of PCBs, will manage short-term human health risks while fish tissue concentrations decrease with ICs and engineering controls, and will implement a community involvement program. Specifically, the exposure of recreational fishers to PCBs in fish tissue will be reduced through the removal of contaminated sediment above the CUL and the removal of the fish from the reservoir and canal system. Ecological receptors of concern will be protected because they will no longer be exposed to PCBs in sediment at levels that result in unacceptable risk.

2.13.2 *Compliance with Applicable or Relevant and Appropriate Requirements and To-Be-Considered Criteria*

The NCP §§ 300.430(f)(5)(ii)(B) and (C) require that a ROD describe the federal and state ARARs that the Selected Remedy will attain or provide justification for any waivers. The implementation of the Selected Remedy generally will not require federal, state, or local permits for on-site response actions (40 CFR 300.400[e][1]), but remedial actions must be completed in conformance with the substantive technical requirements of applicable permit regulations.

ARARs can be classified into the following three categories, although some ARARs may belong to more than one of these categories:

- Chemical-specific ARARs: Typically the environmental laws or standards that result in the establishment of health- or risk-based numerical values. Chemical-specific ARARs are generally identified with reference to specific media and COCs. For example, identifying surface water as a medium of concern triggers consideration of federal clean water regulations;
- Location-specific ARARs: Include restrictions placed on concentrations of hazardous substances or the implementation of certain types of activities based on the location of a site. Some examples of specific locations include floodplains, wetlands, historic places, land use zones, and sensitive habitats; and
- Action-specific ARARs: Generally technology or activity-based limitations or guidelines for management of pollutants, contaminants, or hazardous wastes. These ARARs are triggered by the type of remedial activity selected to achieve

the RAOs and these requirements may indicate how the potential alternative must be achieved.

To-Be-Considered (TBC) criteria are non-promulgated, non-enforceable guidelines, or criteria that may be useful for developing a remedial action or that are necessary for evaluating what is protective for human health and/or the environment. Examples of TBC criteria include EPA drinking water health advisories, reference doses, and cancer slope factors.

The ARARs for the Site are described in the following sections of this ROD. There are no chemical-specific ARARs or TBC criteria applicable to the Site.

Location-Specific ARARs

National Historical Preservation Act

The National Historical Preservation Act (16 U.S. Code Section 470 et seq., 36 CFR Parts 63, 65, and 800) may be applicable if scientific, historical, and archeological data are discovered during the project.

National Flood Insurance Program

The National Flood Insurance Program (42 U.S.C. § 4101 et. seq; 44 C.F.R Part 60) prohibits alteration to rivers or floodplains that may increase potential for flooding. This regulation may be applicable because the Site lies within a 100-year floodplain.

Executive Order 11988, Floodplains Management

Executive Order 11988, Floodplains Management (40 CFR Part 6 Appendix A; 40 CFR Section 6.302; and 42 Federal Register 26951 [May 24, 1977]), requires federal agencies to evaluate the potential effects of actions taken in a floodplain to avoid adverse impacts. The requirements of this Act are applicable because the Site lies within a 100-year floodplain.

Endangered Species Act of 1973

The Endangered Species Act of 1973 (16 U.S. Code Sections 1531, 1532, 1533, 1535, and 1536; and 50 CFR Part 17) requires that federal agencies must confirm any action that is federally authorized, funded, or implemented by the agency is not probable to adversely affect the continued existence of any threatened and endangered species. This Act is applicable if threatened and endangered species are found at the Site.

Migratory Bird Treaty Act

The Migratory Bird Act (16 U.S. Code §§ 703-712) establishes federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the U.S. Fish and Wildlife Service during remedial design and remedial action activities to ensure that the cleanup of the Site does not unnecessarily impact

migratory birds. The requirements of this Act are applicable if the remedy may impact migratory birds.

Texas Administrative Code and Texas Parks and Wildlife Department

The Texas Administrative Code, Title 31 Natural Resources and Conservation; and Part 2 Texas Parks and Wildlife Department, Chapter 65 Wildlife; requires that no person may take, possess, propagate, transport, sell or offer for sale, or ship any species of fish or wildlife listed as threatened or endangered. There is uncertainty regarding whether threatened and endangered species are located at the Site. The ERA conservatively assumed that any threatened or endangered species that could occur within Hidalgo County may be present at the Site. These requirements are applicable if threatened or endangered species are found at the Site.

Action-Specific ARARs

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA, 40 CFR Parts 260 to 268), Subchapter III (Hazardous Waste Management, 42 U.S.C. §§ 6921 et. seq.; 40 C.F.R. Part 262), regulates general hazardous waste management including identification, generation, transportation, storage, disposal of waste; permitting, monitoring, and reporting requirements; authorizations and recognition of state hazardous waste programs; and chemical release reporting. The requirements of this Act are applicable if hazardous waste as defined by RCRA (listed or characteristic) is identified at the Site and requires disposal.

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA; 15 U.S.C. § 2601 et. seq.; 40 CFR part 761) regulates PCBs from their manufacture to disposal.

The requirements of this Act are applicable if PCB remediation waste is generated during remedial activities.

Hazardous Materials Transportation Act

The Hazardous Material Transportation Act (49 U.S.C. §§ 5101 et. seq.; 49 CFR Parts 171-180) requires standards for packaging, documenting, and transporting hazardous materials.

This Act is applicable if hazardous materials are transported off-Site for treatment or disposal.

Texas Administrative Code

Texas Administrative Code Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 335 Industrial Solid Waste and Municipal Hazardous

Waste requires standards for industrial solid waste and municipal hazardous waste depending on classification as hazardous, Class 1, Class 2, or Class 3 waste. 30 Texas Administrative Code, at § 335.508(5), states that media contaminated by a material containing greater than or equal to 50 ppm total PCBs and wastes containing greater than or equal to 50 ppm PCBs shall be classified as Class 1 waste. This regulation is applicable if hazardous, Class 1, Class 2, or Class 3 wastes are generated during remedial activities.

Texas Administrative Code Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 327 Spill Prevention and Control defines reportable quantities, notification requirements, and actions required in the event of a spill or release to the environment of oil, petroleum product, used oil, hazardous substances, industrial solid waste or other substances. This regulation is applicable if a release or spill to the environment occurs during remedial activities.

Texas Administrative Code Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 279 Water Quality Certification establishes procedures and criteria for applying for, processing, and reviewing state certifications under the Clean Water Act Section 401. This regulation is applicable if remedial activities occur in the Arroyo Colorado River.

Texas Administrative Code Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 307 Texas Surface Water Quality Standards sets forth criteria for surface water in Texas. This regulation is applicable if remedial activities occur in the Arroyo Colorado River.

Clean Water Act

The Clean Water Act (CWA), Section 401 Certification (33 U.S.C. § 1341), requires applicants for National Pollutant Discharge Elimination System (NPDES) permits to obtain certification from state or regional regulatory agencies that the proposed discharge will comply with the Clean Water Act Sections 301, 302, 303, 306 and 307. On-site discharges would not require a NPDES permit, but would require compliance with substantive requirements. For off-site actions, certification should occur as part of the state identification of substantive state ARARs (USEPA 1998). This Act would be applicable if remedial activities occur in the Arroyo Colorado River.

The CWA, Section 402 (33 U.S.C. § 1342; 40 C.F.R. Part 125), requires that both on-site and off-site discharges of pollutants from Superfund sites to navigable waters of the United States meet the substantive requirements of the CWA. On-site discharges must comply with the substantive technical requirements of the CWA but do not require a permit. Off-site discharges would be regulated under the conditions of a National Pollutant Discharge Elimination System (NPDES) permit. In Texas, the NPDES program is administered by TCEQ (see Texas Water Code, Title 2 Water Administration, Chapter 26 Water Quality Control). This Act would be applicable if remedial activities occur in the Arroyo Colorado River.

The CWA, Section 404 (33 U.S.C. § 1344), applies to dredging, in-water disposal, capping, construction of berms or levees, stream channelization, excavation, and/or dewatering in navigable waters of the United States. This Act is applicable if remedial activities occur in the Arroyo Colorado River.

The CWA, Sections 303 and 304, Federal Water Quality Criteria (33 U.S.C. § 1313-14), requires that individual states have established water quality standards to protect existing and attainable uses of surface water. These water quality standards may be applicable if remedial activities occur in the Arroyo Colorado River.

Texas Water Code

The Texas Water Code, Title 2 Water Administration, Chapter 26 Water Quality Control (Texas Water Code § 26.121), prohibits any discharge of pollutants into or adjacent to waters in the state except as authorized by the TCEQ. The TCEQ is delegated the authority to issue permits for the discharge of pollutants to the same extent as the NPDES permit program administered by the EPA under the CWA Section 402. On-site discharges must comply with the substantive requirements of the CWA but do not require a permit. Off-site discharges would be regulated under the conditions of a Texas Pollutant Discharge Elimination System (TPDES) permit. Direct discharges must meet technology-based requirements. This Act is applicable if remedial activities occur in the Arroyo Colorado River.

Rivers and Harbors Act

The Rivers and Harbors Act of 1899, Obstruction of Navigable Waters (33 U.S.C. § 401), controls the alteration of navigable waters, including construction of structures such as piers, berms and installation of pilings, as well as excavation and fill. No permit is required for on-site activities, but in-water construction activities must comply with the substantive requirements of the Act. This Act is applicable if remedial activities occur in the Arroyo Colorado River.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 U.S. Code Section 662 et. seq.) is applicable when modifications to a stream or other water body are proposed or approved by any United States agency, and such agency shall review with the U.S. Fish and Wildlife Service, Department of the Interior, and with the head of the agency overseeing the wildlife resources of the Site. The requirements of this Act are applicable if remedial activities would modify streams or other water bodies.

2.13.3 *Cost Effectiveness*

The Selected Remedy is cost-effective and represents a reasonable value for the costs incurred. Section 300.430(f)(1)(ii)(D) of the NCP states that “A remedy shall be cost effective if its costs are proportional to its overall effectiveness.” The EPA evaluated the “overall effectiveness” of those alternatives that satisfied the threshold criteria (i.e.,

protection of human health and the environment and compliance with ARARs) by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The overall effectiveness of this remedial alternative was determined to be proportional to its costs and therefore the Selected Remedy (i.e., Alternative 6) represents a reasonable value for the money to be spent. The total estimated net present value cost to implement the Selected Remedy is $19.4 million.

2.13.4 *Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable*

The EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, the EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering State and community acceptance.

2.13.5 *Preference for Treatment as a Principal Element*

The NCP establishes a preference for use of treatment to address the principal threats posed by a site wherever practicable (NCP § 300.430[a][1][iii][A]). The principal threat concept is applied to the characterization of source materials at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water, or air; or acts as a source for direct exposure. Principal threat wastes are those materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Low-level threat wastes are those materials that generally can be reliably contained and that would present only a low risk in the event of exposure.

The source material at the Site is found in the existing Siphon and the contaminated sediment located downstream of the Siphon's exit. The Siphon and the contaminated sediment are not highly toxic or highly mobile, and thus are low-level waste and not principal threat waste.

The HHRA (EA 2016b) determined that there were no unacceptable human health concerns for direct contact with sediment containing PCBs. The carcinogenic risks for the adult, adolescent, and child recreational users are 1×10^{-7}, respectively, which are all below the lower end of the EPA's target risk range (i.e., 1×10^{-6}). The total non-carcinogenic HIs for the adult, adolescent, and child recreational users are 0.008, 0.03, and 0.05, respectively, which are all below the EPA's acceptable threshold (i.e., 1.0).

Also, PCBs are hydrophobic, which means that they tend to bind to sediment particles, organic matter in sediment, and fatty tissues in biota (EA 2016b). Suspended sediment in surface water at the Site tends to settle out onto the bottom of the canal system immediately downgradient of the existing Siphon's exit due to low water velocities resulting in a gradient of decreasing PCB sediment concentrations with distance from the Siphon's exit. The RI (EA 2016a) determined that the highest concentrations of PCBs were found immediately downgradient of the existing Siphon's exit. As a result, contaminated sediment is effectively contained within the reservoir and canal system and is not considered a highly mobile source material.

Additionally, it is likely that the Siphon's construction/repair materials (e.g., concrete, caulking, grout, or sealants) were a primary source of contamination at the Site. The RI (EA 2016a) determined that the concentrations of PCBs in the surface water taken from within the existing Siphon and analyzed for Total PCB Congeners ranged from 190 to 1,700 picograms/liter (pg/L). These concentrations are well below the federal surface water quality criteria for aquatic life (i.e., 14,000 pg/L) and the Total PCB maximum contaminant level for drinking water (i.e., 500,000 pg/L).

2.13.6 *Five-Year Review Requirements*

Because the implementation of the Selected Remedy will result in hazardous substances remaining on-Site above levels that allow for unlimited use and unrestricted exposure, a statutory Five-Year Review will be conducted pursuant to Section 121(c) of CERCLA and 40 CFR § 300.430(f)(4)(ii) within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment. During the statutory reviews, the EPA will evaluate monitoring data collected prior to the review period and assess the effectiveness of the Selected Remedy. If the EPA determines that the RAOs are not being met or that the Selected Remedy is no longer protective, the remedy will be reevaluated and an Explanation of Significant Differences document or ROD Amendment may be required.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

To fulfill CERCLA §117(b) and the NCP §§300.430(f)(5)(iii)(B) and 300.430(f)(3)(ii)(A), the ROD must document and discuss the reasons for any significant changes made to the Selected Remedy. Changes described in this section of the ROD are limited to those that could have been reasonably anticipated by the public from the time the Proposed Plan, RI, and FS were released for public comment to the final selection of Alternative 6 as the Selected Remedy. Changes that could not have been anticipated require an additional public comment period.

The Proposed Plan was released for public comment on May 7, 2018. The EPA held two public meetings on May 22, 2018, in Donna and Alamo, Texas, to present the Proposed Plan to the public and solicit the public's comments. The public comment period for the Proposed Plan ended on June 5, 2018. The Proposed Plan identified Alternative 6 (Replace Siphon, Canal Dredging, and Fish Removals) as the Preferred Alternative. The EPA reviewed all written and oral comments submitted during the

public comment period and determined that no significant changes to the Preferred Alternative, as originally identified in the Proposed Plan, were necessary or appropriate.

Based on the public's comments, the EPA has reconsidered the number of fish removal actions and the performance of an iterative/flexible approach for the remedial action. The EPA will reevaluate the need to conduct additional fish removals based on the attainment of the fish tissue RG. Additionally, the EPA has removed references concerning the performance of an iterative/flexible approach from the ROD and will perform the remedial action based on the remedial design.

2.15 STATE ROLE

The State of Texas, represented by the TCEQ, was provided the opportunity to review and comment on the EPA's Selected Remedy (Alternative 6 – Replace Siphon, Dredge Sediments, and Fish Removals).

PART 3: RESPONSIVENESS SUMMARY

The Responsiveness Summary summarizes information about the views of the support agency and the public regarding both the remedial alternatives and general concerns about the Site submitted during the public comment period. This summary also documents, in the administrative record, how the public's comments were integrated into the EPA's decision-making process.

The public meetings announcing the Proposed Plan were held on May 22, 2018, in Alamo and Donna, Texas. The Proposed Plan described the EPA's rationale for the selection of the Preferred Alternative. A public comment period for the Proposed Plan was held from May 7 through June 5, 2018. Public notices of the public meeting and public comment period were published in two newspapers of general circulation, in English and Spanish. Additionally, public notices announcing the Proposed Plan, public meeting, and comment period were mailed to the contacts included in the Site's mailing list. Representatives from the EPA provided presentations on the Proposed Plan and answered questions about the EPA's Preferred Alternative. Representatives from the TCEQ and the Texas Department of State Health Services were also present at the meeting. Oral and written comments were accepted at the meeting and a court reporter transcribed the discussions held during the meeting.

The Administrative Record file for the Site; located at the Donna Public Library, TCEQ's offices, and the EPA's regional office contains all the information and documents supporting this ROD (see Section 2.3.3 [Information Repositories] of this ROD). This Administrative Record file includes transcripts of the oral comments received during the two public meetings held in Donna and Alamo, Texas, on May 22, 2018, by the EPA. This Administrative Record also contains each of the comments received from the public through postal or electronic mail.

The majority of the comments received during the public meetings and public comment period concerning the Proposed Plan were in support of the EPA's Preferred Alternative 6 (i.e., Replace Siphon, Dredge Sediments, and Fish Removals) presented in the Proposed Plan. The concerns of the community have been considered in the selection of Alternative 6 as the Selected Remedy for the Site. The following section of this ROD summarizes the stakeholder's comments, received during the public comment period, and the EPA's responses to these comments.

3.1 STAKEHOLDER'S COMMENTS AND EPA'S RESPONSES

Comment 1: *Where will the sediments removed be taken? Will it continue to impact human health?*

EPA's Response: The sediment dredged/excavated from the canal system, downgradient of the existing Siphon's exit, will be analyzed for Polychlorinated Biphenyl (PCB) concentrations and will be disposed in accordance with applicable federal and state standards for waste disposal at an appropriately permitted landfill. Permitted landfills are designed to segregate waste and prevent exposure of these materials. The

specific landfill will be determined during the remedial design or a competitive bid process.

Comment 2: *Since the siphon will be left in place, will it be protected?*

EPA's Response: After the construction of a new siphon, the existing Siphon will be sealed in place (i.e., grouted). A component of the Selected Remedy includes the implementation of institutional controls (ICs) required to protect the integrity of the Selected Remedy, which includes providing notification to interested parties of the existence of the Siphon which likely contains construction materials (e.g., concrete, caulking, grout, or sealants) containing PCBs.

An IC(s), in the form of a land-use restriction or notice as to the environmental conditions of the property, would be required that provides restrictions on or notification of the modifications to the existing Siphon (i.e., grouting in place) and which would protect the integrity of the remedy. The IC(s) would consist of either a restrictive covenant or a deed notice. The requirements for filing land use restrictions in the State of Texas are specified in "30 Texas Administrative Code Chapter 350 Subchapter F," under the jurisdiction of the Texas Commission on Environmental Quality. A restrictive covenant, or deed notice, is an instrument filed in the real property records of the county where the affected property is located.

Comment 3: *How will the EPA distribute information on the Texas Department of Health Aquatic Life Order #9? Also, can all signs be printed in Spanish and English so the entire community can understand them?*

EPA's Response: The distribution of the information associated with the existing Aquatic Life Order Number 9 will be a significant component of the community involvement program established under the Selected Remedy. Due to the demographics of the local area surrounding the Site, the EPA expects that most of the information developed for the public under this Record of Decision (i.e., signs, informative materials, etc.) will be presented in English and Spanish, to the extent practicable. The specific details of this type of information will be determined during the remedial design of the Selected Remedy.

Comment 4: *Is there any way to let the community know where it is safe to fish?*

EPA's Response: The Aquatic Life Order Number 9, maintained by the Texas Department of State Health Services (TDSHS) since 1994, states that ". . . the Donna Irrigation System [the Site] located in Hidalgo County is declared a prohibited area for the taking of all species of aquatic life." A map included with the TDSHS' order depicted the prohibited area for the taking of fish as the canal system extending from the Rio Grande River to the northern uppermost sections of Donna Lake, which was investigated by the EPA. Fishing, for recreation, is not directly prohibited under the order. Figure 1 (Site Location) of the Record of Decision includes a map of the extent of the reservoir and canal system operated by the Donna Irrigation District (Hidalgo County No. 1).

Based on the Human Health Risk Assessment, the EPA has concluded that fish from the Site are not safe for human consumption and should not be “taken” from the Site with the intent of consumption. The EPA believes that contaminated fish may be found within all reaches of the Donna Reservoir and Canal System. The specific details of the dissemination of information related to fishing in areas other than the Site will be determined during the remedial design of the Selected Remedy.

Comment 5: *Will you be checking remediation progress every five years? It would be greatly appreciated if you could make this information public.*

EPA’s Response: The Selected Remedy for the Site will require statutory Five-Year Reviews, initially beginning five years after the construction of the remedial action, since contaminants (i.e., PCBs) will be left on-Site above levels that permit unrestricted use and unlimited exposure. Although the EPA routinely evaluates the remedy, a formal review will occur every five years in the form of a Five-Year Review Report where the EPA will evaluate the performance of the remedy (i.e., protectiveness of human health and the environment). Community involvement and notification is a key component of the Five-Year Review process. The Five-Year Review Report is a publicly available agency decision document.

Comment 6: *When is the project actually going to start? When would it be over? And if we had any problems for getting water for the City, because as I heard right now, that's where they're getting us water right now.*

EPA’s Response: The actual start date for the implementation of the Selected Remedy has not been determined. Before its implementation, the remedial design of the Selected Remedy (i.e., remedial action) will need to be accomplished and can take several months depending on the complexity of the remedial action. The EPA will make every effort to begin the implementation of the remedial action as soon as feasibly possible. Once initiated, the construction time for the remedial action is estimated at nine months.

The EPA considered the Donna Irrigation District’s need to provide, upon demand, drinking water to the City of Donna and to the North Alamo Water Supply Corporation Plant No. 5, including providing irrigation water for the surrounding predominantly agricultural land. At no time during the implementation of the Selected Remedy will the reservoir and canal system be required to shut down and not be able to supply drinking or irrigation water to the local community.

Comment 7: *I am concerned about the long time line for the completed project and the possibility of remediation plans being fought in court or slowed to the point of inaction. The community wants action on this problem.*

EPA’s Response: The actual start date for the implementation of the Selected Remedy has not been determined. Before its implementation, the remedial design of the Selected Remedy (i.e., remedial action) will need to be accomplished and can take several months depending on the complexity of the remedial action. The EPA will make

every effort to begin the implementation of the remedial action as soon as feasibly possible. Once initiated, the construction time for the remedial action is estimated at nine months. Based on current information, the EPA does not anticipate any possible court actions regarding the remediation plans.

Comment 8: *We also had questions about where the sediment is going to be scraped off. We understand that there are certain locations that have been pinpointed as high, but we're wondering if in the reservoir itself where the people go and fish if that will be scraped, because it has been over 96 years of accumulation of PCBs since 1926.*

EPA's Response: The area to be dredged/excavated, under the Selected Remedy's requirement to meet the sediment cleanup level, spans the width of the Lower West Main Canal Unlined approximately 4,500 feet beyond the Siphon's exit (i.e., an area approximately 55 feet wide by 4,500 feet in length). Approximately 20 inches of sediment will be mechanically dredged/excavated from the canal using clamshell excavation methods or similar equipment. A volume of approximately 20,000 cubic yards of sediment will be excavated from the canal. This area has been identified as the most heavily contaminated area of the Site. PCB concentrations in sediment within this portion of the canal system decrease with distance from the Siphon's exit; thus, sediment in the reservoir itself did not have concentrations of PCBs exceeding the cleanup levels for the sediment and therefore is not planned for removal at this time.

Comment 9: *I think it is a good idea to offer free blood testing to local residents even though there are not clinical reference standards, etc. Some may want to know how their levels look in comparison with those of typical U.S. residents.*

EPA's Response: The EPA does not have the authority to conduct such testing. Blood testing of residents is a function of the local county/state health departments and the TDSHS. The EPA recommends that concerned individuals contact these entities to determine the blood testing options that are available to them.

Comment 10: *Why would increased water flow in the siphon have a potential to increase the PCB concentration?*

EPA's Response: The release of PCBs from the Siphon's construction materials (e.g., concrete, caulking, grout, or sealants) to surface water from within the interior of the Siphon occurs slowly but steadily. The water flow rate, be it slow or fast, will not decrease or increase the rate of release of PCBs into the water column. A faster flow rate may cause the PCB concentrations in surface water to decrease because the relatively constant release rate of PCBs from within the Siphon would be diluted even further. PCBs, being hydrophobic, are not stable in an aqueous environment and are typically not measured in high concentrations in water, which was determined during the investigation of the Site. The issue at the Site is not the rate at which PCBs are being released from the likely source (i.e., the Siphon) into the water column, but the stability and longevity of the PCBs (i.e., do not easily degrade in the environment), their affinity to bioaccumulate, and their toxicity.

Comment 11: *The surface water measurements inside the Siphon were taken at different flow rates (i.e., at the end of the Siphon) and a one-time sampling event is not sufficient to ID a source. A faster flow rate equates to greater concentrations in surface water due to turbulence and higher concentrations in suspended particles.*

EPA's Response: The likely release of PCBs from the Siphon's construction materials (e.g., concrete, caulking, grout, or sealants) to surface water from within the interior of the Siphon occurs slowly but steadily. The water flow rate, be it slow or fast, will not decrease or increase the rate of release of PCBs into the water column. A faster flow rate may cause the PCB concentrations in surface water to decrease because the relatively constant release rate of PCBs from within the Siphon would be diluted even further. PCBs, being hydrophobic, are not stable in an aqueous environment and are typically not measured in high concentrations in water, which was determined during the remedial investigation of the Site. The issue at the Site is not the rate at which PCBs are being released from the likely source (i.e., the Siphon) into the water column, but the stability and longevity of the PCBs (i.e., do not easily degrade in the environment), their affinity to bioaccumulate, and their toxicity.

The EPA's determination that the likely source of contamination at the Site is the existing Siphon was made based upon the data collected during the remedial investigation and on the weight of evidence. Sediment data collected during remedial investigation initially suggested the following options for the location of the source of PCB contamination at the Site: (1) Between the Siphon's exit and the 90-degree bend in the Lower West Main Canal Unlined in the area with the most elevated concentrations of PCBs in sediment, (2) Immediately upgradient of the Siphon's exit and downgradient of the Main Canal (i.e., in the 160-feet concrete-lined section between the weir and the Siphon's exit), or (3) No longer present at the Site.

The following additional field investigation activities narrowed down the location of the likely source of contamination even further:

- The water-based geophysical survey provided targets for further investigation by the scientific divers in the Lower West Main Canal Unlined. The divers found no indication of PCB-laden objects in the canal, which eliminates Option 1 (i.e., that the source of contamination is in the Lower West Main Canal Unlined).
- Surface water samples collected from within the interior of the Siphon and passive samples collected downgradient of the Siphon's exit indicate that PCBs persist in the water column upon exiting the Siphon and the concentrations within the water column decrease with distance from the Siphon's exit. Therefore; these data indicate that a continuing source of PCB contamination exists at the Site, which eliminates Option 3 (i.e., that a primary source contamination is no longer present at the Site).
- The remote-operated vehicle inspection of the Siphon indicates that no foreign objects which could contain PCBs (e.g., transformers, drums, etc.) are located within the interior of the Siphon.

- The hydraulics of the Siphon indicate that most of the time, a positive pressure is exerted from the interior of the Siphon. Therefore, water would be forced out of cracks or leaking joints in the Siphon and the chances of contamination leaking into the Siphon are low.

Therefore, by the weight of evidence from the field investigations, the primary likely source of PCBs at the Site is located within the inverted Siphon and is not a foreign object, as described in Option 2.

Comment 12: *Are the prohibitions on fishing going to be extended throughout the whole irrigation system that's being fed by Donna Lake?*

EPA's Response: The Aquatic Life Order Number 9, maintained by the TDSHS since 1994, states that ". . . the Donna Irrigation System [the Site] located in Hidalgo County is declared a prohibited area for the taking of all species of aquatic life." A map included with the TDSHS' order depicted the prohibited area for the taking of fish as the canal system extending from the Rio Grande River to the uppermost northern sections of Donna Lake, which was investigated by the EPA. Fishing, for recreation, is not directly prohibited under the order. Figure 1 (Site Location) of the Record of Decision includes a map of the extent of the reservoir and canal system operated by the Donna Irrigation District (Hidalgo County No. 1). The authority to extend the prohibited area for the taking of fish to the entire Donna Irrigation System is under the jurisdiction of the TDSHS.

Based on the Human Health Risk Assessment, the EPA has concluded that fish from the Site are not safe for human consumption and should not be "taken" from the Site with the intent of consumption. The EPA believes that contaminated fish may be found within all reaches of the Donna Reservoir and Canal System.

Comment 13: *Will there be any opportunity for the community to comment on the design/presentation of signs and educational materials?*

EPA's Response: As a component of the Selected Remedy, the EPA will consider the formation of an advisory group during the remedial design of the Selected Remedy. The intent for the formation of this group is to work collaboratively with the EPA, and other appropriate entities, in developing and implementing a community involvement program which would include the development of signs and educational materials.

Comment 14: *Who will pay for the remedial action?*

EPA's Response: The EPA's "enforcement first" policy under the Superfund program requires that the EPA seek potentially responsible parties (PRPs) to fund remedial action(s) at a site. Whenever possible, through administrative and legal actions, the EPA requires PRPs to clean up hazardous sites they have contaminated. The EPA will exhaust its enforcement authority against a PRP(s) before seeking other funding mechanisms.

Comment 15: *Does the fishing ban apply to the little body of water at La Frontera? Can EPA install signs at La Frontera?*

EPA's Response: The Aquatic Life Order Number 9, maintained by the TDSHS since 1994, states that ". . . the Donna Irrigation System [the Site] located in Hidalgo County is declared a prohibited area for the taking of all species of aquatic life." A map included with the TDSHS' order depicted the prohibited area for the taking of fish as the canal system extending from the Rio Grande River to the uppermost northern sections of Donna Lake, which was investigated by the EPA. Fishing, for recreation, is not directly prohibited under the order. Figure 1 (Site Location) of the Record of Decision includes a map of the extent of the reservoir and canal system operated by the Donna Irrigation District (Hidalgo County No. 1).

The EPA is uncertain whether the body of water located near La Frontera is included in the area subject to the TDSHS' Aquatic Life Order Number 9. However, the EPA recommends that the community assume that the body of water is included in the order if it is hydraulically connected to the Donna Reservoir and Canal System from the Rio Grande River to the uppermost northern sections of Donna Lake. The EPA will consider installing signs in water bodies hydraulically connected to the reservoir and canal system during the remedial design of the Selected Remedy.

Comment 16: *On page twelve under the Demographic and Cultural Features the report cites the cities of Donna and Alamo as part of the McAllen-Edinburg-Mission Metro. While this is correct, there are other data sets including Census block data that can be used to more properly describe the specific demographic information of the affected communities including household size, race, income and Limited English proficiency. The same can be said about what was mentioned on the colonias. More information is especially important since colonias have comparable differences in the demographic information, to the metro average, are part of the affected communities, include higher concentrations of protected classes and are ultimately part of the reason why the Donna Superfund Site is an environmental justice issue. We recommend using census tract information to describe the affected areas including the Cities Alamo and Donna, and surrounding colonias since it is more descriptive than using the metro regions average.*

EPA's Response: The information included in the Demographics and Cultural Features section of the Proposed Plan was developed during the remedial investigation of the Site and is included in the Administrative Record file for the Site. As noted in the comment, the EPA believes that this information is factual and consistent with the main purpose of the remedial investigation, which is to determine the nature and extent of contamination at the Site.

Comment 17: *On page 13 under Natural Resources and Land Use you cite use of the canal as "primarily agricultural." It is important to note that the canal is also very popular among fishermen. The use of the roads that pass through the property and make the contaminated natural resources accessible should also be included in this section.*

EPA's Response: The EPA, in the Human Health Risk Assessment, considered the exposure of an adult, adolescent, and a child recreational user to contaminants from the Site through the ingestion and dermal contact with surface water and sediment, and ingestion of fish. This consideration accounts for anglers that would frequently access the Site for fishing purposes and includes all areas within the reservoir and canal system.

Comment 18: *We believe that in Alternative 6 (Replace Siphon, Canal Dredging/Excavation, and Fish Removals), is the most comprehensive of the options provided however, more should be considered in the proposed plan to make this solution responsive to the affected communities' needs. One main concern with Alternative 6 is that the source of the contamination, the siphon, will only be replaced and not removed from the site. The removal of the source of contaminants and its safe disposal is a necessary part of a long-term solution and should be included in this alternative.*

EPA's Response: Based on the results of the remedial investigation, the EPA does not believe that the existing Siphon should be completely removed from the Site. Once the Selected Remedy is implemented, the existing Siphon will no longer be in contact with the surface water within the reservoir and canal system and there will be no pathway for any residual contamination to enter the water. A component of the Selected Remedy is to dewater the Siphon and to completely seal it in place (i.e., by grouting) to prevent exposure to human and ecological receptors. Once grouted in place, there will be no pathway for the PCBs to migrate from the decommissioned Siphon into the reservoir and canal system.

Soil, sediment, and surface water samples were collected near the Siphon, near the Arroyo Colorado River, during the remedial investigation and analyzed for PCBs, among other analytes. The analytical results from samples collected within the Arroyo Colorado River were evaluated in the human health and ecological risk assessments and did not indicate a current unacceptable risk to human or ecological receptors from PCBs. Therefore, the EPA does not expect any unacceptable risks to receptors once the Siphon is grouted in place and decommissioned.

Comment 19: *Under Alternative 6 (Replacement Siphon), the old Siphon should be completely removed since it would be a continuing source (i.e., outside concrete structure).*

EPA's Response: Based on the results of the remedial investigation, the EPA does not believe that the existing Siphon should be completely removed from the Site. Once the Selected Remedy is implemented, the existing Siphon will no longer be in contact with the surface water within the reservoir and canal system and there will be no pathway for any residual contamination to enter the water. A component of the Selected Remedy is to dewater the Siphon and to completely seal it in place (i.e., by grouting) to prevent exposure to human and ecological receptors. Once grouted in place, there will be no pathway for the PCBs to migrate from the decommissioned Siphon into the reservoir and canal system.

Soil, sediment, and surface water samples were collected near the Siphon, near the Arroyo Colorado River, during the remedial investigation and analyzed for PCBs, among other analytes. The analytical results from samples collected within the Arroyo Colorado River were evaluated in the human health and ecological risk assessments and did not indicate a current unacceptable risk to human or ecological receptors from PCBs. Therefore, the EPA does not expect any unacceptable risks to receptors once the Siphon is grouted in place and decommissioned.

Comment 20: *Regarding the second Remedial Action Objective and the Preliminary Remediation Goal of "reducing or removing the fish from the reservoir," according to the plan the "objective will be measured by the number, species, and size of the fish removed from the reservoir and canal system." We agree that the removal of the fish should be a part of the remediation as they are a human health hazards. We echo resident concerns on the need for more consistent fish removals. We believe doubling the suggested amount of one removal a year to biannual removals for five years would be better for maintaining a low-fish population and deterring anglers. We also suggest that more specific and measurable goals for the fish removal be identified since they are needed to understand the efficacy of the remedial efforts.*

EPA's Response: Additional fish removals, other than those included in the Selected Remedy (i.e., annually for five years), may be performed at the Site when appropriate to meet the Remediation Goal for Total PCBs in fish tissue. The specific details concerning the timing and measurable key indicators or monitored parameters to determine the success of the fish removal actions will be determined during the remedial design of the Selected Remedy.

Comment 21: *We agree that deed notifications are important for potential future buyers to be informed. We also agree with the inclusion of signage "which warn anglers of the risks associated with the consumption of fish from the Site." We would like to see more details about the amount of signs that will be posted and where, the design of the warnings to assure that they are bilingual and culturally relevant, and information on the party responsible for maintenance and upkeep of the signs, in case they need to be replaced. Additionally, we suggest that fencing be erected in the areas of the lake and reservoir that border residential areas in order to deter fishing. The Donna Irrigation District #1 should be required to reduce the accessibility of their private property, this includes closing off farm roads used by the public.*

EPA's Response: The specific details concerning the signage (e.g., number, design, and the specific language) will be determined during the remedial design of the Selected Remedy. Also, due to the demographics of the local area surrounding the Site, the EPA expects that most of the information developed for the public under this Record of Decision (i.e., signs, informative materials, etc.) will be presented in English and Spanish, to the extent practicable. The construction of fencing at the Site, to the extent practicable, would be considered an engineering control. This type of control will also be considered during the remedial design of the Selected Remedy.

Comment 22: *Under the Public Outreach and Education section of the plan, the EPA identifies activities and programs that "may be considered for implementation." Because remediation has taken so long, we believe that all of the activities and programs identified for public outreach should be conducted. We echo the community suggestion for the creation and maintenance of a collaborative working group to develop inclusive and culturally appropriate outreach and education efforts that includes residents, advocates, local, state and EPA officials. Previous working groups that met quarterly (including advocates, residents, local, state and federal official) have shown positive impacts in community engagement on environmental concerns of the Superfund Site. We suggest hosting biannual workgroup meetings to coincide with the fish removal actions. At these meetings the working group can receive updates on remediation and plan the educational and public outreach.*

EPA's Response: As a component of the Selected Remedy, the EPA will consider the formation of an advisory group during the remedial design of the Selected Remedy. The intent for the formation of this group is to work collaboratively with the EPA, and other appropriate entities, in developing and implementing a community involvement program. The EPA agrees that this group should ideally consist of a diverse group of individuals to be effective.

Comment 23: *While the EPA has noted the increased cancer-hazards to the surrounding communities, the agency does not provide suggestions for identifying residents affected directly or the option for residents to test themselves. We request that the suggested alternative include PCB testing (blood tests) for residents who are concerned about personal contamination from ingesting the fish in Donna Lake.*

EPA's Response: The EPA does not have the authority to conduct such testing. Blood testing of residents is a function of the local county/state health departments and the TDSHS. The EPA recommends that concerned individuals contact these entities to determine the blood testing options that are available to them.

Comment 24: *We agree with continuing the enforcement of the "Aquatic Life Order #9" until the PCB levels in the fish are safe but believe more should be detailed to understand how Texas Parks and Wildlife Department will enforce the order. A description of the protocols that the department follows when encountering a fisherman, educating the public or enforcing the order should be developed. The TPWD should also conduct weekly visits to the site and maintain a record of said visits.*

EPA's Response: The EPA agrees that the maintenance of the existing Aquatic Life Order Number 9, maintained by the TDSHS, is an essential IC component of the Selected Remedy. However, the enforcement of this order is outside the scope of the EPA's jurisdiction and this Record of Decision. As noted in the comment, the enforcement authority for this order is the Texas Parks and Wildlife Department (i.e., Game Warden). A representative of this department was present at the May 22, 2018, public meeting held in Alamo, Texas, by the EPA to present the Proposed Plan to the public.

Comment 25: *A water conduit should be constructed over the Arroyo Colorado to transport water, instead of underneath the Arroyo.*

EPA's Response: Flood control levees, under the jurisdiction of the International Boundary and Water Commission, are located on either side of the Arroyo Colorado River. The EPA does not have the authority to dictate the construction of the water conduit. The EPA's authority is limited to addressing the threat and/or actual release of hazardous substances and contaminants or pollutants.

Comment 26: *As the agency moves forward, please emphasize that fishing, boating, or other access by the public to the District's canals and reservoirs and other infrastructure is strictly prohibited. It has been impossible for the District to prevent such public access because of the size, nature, and location of these private structures; however, access is never authorized without permission. The overall approach to public education about the dangers of ingesting aquatic life from these water bodies implies that the prohibited public access is based solely on the associated health risks. In fact, the public is prohibited from access whether or not such danger is present.*

EPA's Response: As a component of the Selected Remedy, the EPA will consider the formation of an advisory group during the remedial design of the Selected Remedy. The intent for the formation of this group is to work collaboratively with the EPA, and other appropriate entities, including the Irrigation District, in developing and implementing a community involvement program. The issues associated with access could be a topic for the group's discussion. The EPA does not have authority to prohibit access to private property. Any Institutional Controls to limit access to the implemented remedy would have to done in agreement and coordination with affected property owners.

Comment 27: *The District also urges EPA to combine the siphon and sediment remedial work with the International Boundary and Water Commission's (IBWC) planned Donna Canal Levee Gap Project, which will involve the same infrastructure covered by EPA's Proposed Plan. Both projects will be paid for primarily with federal dollars. Both projects will benefit the health and safety of the community – EPA focused on removing contamination and IBWC focused on protecting the community from flooding. The District, a local governmental entity, will co-operate and co-ordinate with both federal entities. Such a holistic approach could be a model for interagency co-operation for reaching disparate technical goals, while at the same time improving water delivery to the residents and farms of this area.*

EPA's Response: Any issues associated with the International Boundary and Water Commission's jurisdiction and their planned work and the EPA's implementation of the Selected Remedy will be considered during the remedial design of the Selected Remedy.

Comment 28: *I believe that dumping source is the cause of pollution for this area.*

EPA's Response: The EPA's determination that the likely source of contamination at the Site is the existing Siphon was made based upon the data collected during the

remedial investigation and on the weight of evidence. Sediment data collected during remedial investigation initially suggested the following options for the location of the source of PCB contamination at the Site: (1) Between the Siphon's exit and the 90-degree bend in the Lower West Main Canal Unlined in the area with the most elevated concentrations of PCBs in sediment, (2) Immediately upgradient of the Siphon's exit and downgradient of the Main Canal (i.e., in the 160-feet concrete-lined section between the weir and the Siphon's exit), or (3) No longer present at the Site.

The following additional field investigation activities narrowed down the location of the likely source of contamination even further:

- The water-based geophysical survey provided targets for further investigation by the scientific divers in the Lower West Main Canal Unlined. The divers found no indication of PCB-laden objects in the canal, which eliminates Option 1 (i.e., that the source of contamination is in the Lower West Main Canal Unlined).
- Surface water samples collected from within the interior of the Siphon and passive samples collected downgradient of the Siphon's exit indicate that PCBs persist in the water column upon exiting the Siphon and the concentrations within the water column decrease with distance from the Siphon's exit. Therefore; these data indicate that a continuing source of PCB contamination exists at the Site, which eliminates Option 3 (i.e., that a primary source contamination is no longer present at the Site).
- The remote-operated vehicle inspection of the Siphon indicates that no foreign objects which could contain PCBs (e.g., transformers, drums, etc.) are located within the interior of the Siphon.
- The hydraulics of the Siphon indicate that most of the time, a positive pressure is exerted from the interior of the Siphon. Therefore, water would be forced out of cracks or leaking joints in the Siphon and the chances of contamination leaking into the Siphon are low.

Therefore, by the weight of evidence from the field investigations, the primary likely source of PCBs at the Site is located within the inverted Siphon and is not a foreign object, as described in Option 2.

Comment 29: *I have a concern that the whole irrigation system should have signs, because the fish are distributed throughout the canals, and people fish in the canals regularly. I think local residents need to have information about where the irrigation canals fed by the reservoir are so that they can avoid fishing there. We were told in the focus groups that the signs should be in the community, not just at the lake; some commented that signs at the mailboxes in the colonias would be a good idea.*

EPA's Response: The Aquatic Life Order Number 9, maintained by the TDSHS since 1994, states that ". . . the Donna Irrigation System [the Site] located in Hidalgo County is declared a prohibited area for the taking of all species of aquatic life." A map included with the TDSHS' order depicted the prohibited area for the taking of fish as the canal

system extending from the Rio Grande River to the uppermost northern sections of Donna Lake, which was investigated by the EPA. Fishing, for recreation, is not directly prohibited under the order. Figure 1 (Site Location) of the Record of Decision includes a map of the extent of the reservoir and canal system operated by the Donna Irrigation District (Hidalgo County No. 1).

Based on the Human Health Risk Assessment, the EPA has concluded that fish from the Site are not safe for human consumption and should not be "taken" from the Site with the intent of consumption. The EPA believes that contaminated fish may be found within all reaches of the Donna Reservoir and Canal System.

The specific details concerning the signage (e.g., number, design, locations, and the specific language) will be determined during the remedial design of the Selected Remedy. Also, due to the demographics of the local area surrounding the Site, the EPA expects that most of the information developed for the public under this Record of Decision (i.e., signs, informative materials, etc.) will be presented in English and Spanish, to the extent practicable.

Comment 30: *I vigorously support the concept of having input from local community members living in the area to educational materials and signs. On the working group, there need to be at least two local residents so that they can support one another when warranted in making an unexpected point to the rest of the group. That is, the "community outreach" should be a two-way street, both to and from those who seek to increase awareness of the prohibition on "keeping" the fish. The local community members should be people who live near the reservoir, not simply staff members of community service organizations (who should be included additionally to the local community members).*

EPA's Response: As a component of the Selected Remedy, the EPA will consider the formation of an advisory group during the remedial design of the Selected Remedy. The intent for the formation of this group is to work collaboratively with the EPA, and other appropriate entities, in developing and implementing a community involvement program. The EPA agrees that this group should ideally consist of a diverse group of individuals, including local community members, to be effective.

Comment 31: *The concepts of "continuous and culturally appropriate outreach and education," "to include local stakeholders," and "to be created and sustained during remediation" are all important to assist the community in becoming more aware of the fish contamination. The EPA should commit to providing bilingual, English and Spanish, information for all permits required for remediation projects. For example, if the EPA is required to obtain a Texas Pollutant Discharge Elimination System ("TPDES") Construction General Permit from the TCEQ, which is likely, the EPA should commit to providing the requisite Storm Water Pollution Prevention Plan ("SWPPP") in Spanish and, in addition to posting it at the construction site, maintaining a copy for public viewing at a local site, such as a library.*

EPA's Response: Due to the demographics of the local area surrounding the Site, the EPA expects that most of the information developed for the public under this Record of Decision (i.e., signs, informative materials, etc.) will be presented in English and Spanish, to the extent practicable. The EPA does not have jurisdiction on whether any permits required for the implementation of the Selected Remedy are provided in Spanish. This option would be at the discretion of the permitting authority. Additionally, any information developed because of the implementation of the Selected Remedy will be placed in the Administrative Record file for the Site located at the Donna Public Library, the TCEQ's offices, and the EPA's regional office. This Administrative Record file contains all the information and documents supporting this Record of Decision (see Section 2.3.3 [Information Repositories]), and will subsequently include any information developed during the implementation of the Selected Remedy. Additionally, the EPA will adhere to any requirements requiring the posting of permits at the construction site.

Comment 32: *The HCRMA is the Local Government (LG) sponsor for a transportation improvement project of a future controlled access freeway called the International Bridge Trade Corridor (IBTC) (Location Map attached) in which we are currently undergoing NEPA investigation/clearance activities. Our project development activities are governed by agreements with Texas Department of Transportation (TxDOT) which currently has NEPA assignment from FHWA for various types of documents including environmental assessments (which this project is currently classified). We are in the initial stages of performing Hazmat Initial Site Assessments and will have eventual follow-up on a potential IBTC route that traverses the Donna Superfund site. The HCRMA wanted to make their position known to EPA/TCEQ that we have an interest in learning more about the proposed Institutional Controls (IC's) discussed at the May 22, 2018 public hearing. The HCRMA believes there are technical means (via design and specification solutions to our plans package) that can balance safety concerns during construction and operation — as such we have an interest to discuss proposed project actions that can achieve development interests within this soon-to-be remediated Superfund site. We would appreciate being included in future publications, studies, decisions, and eventual guidance that will govern future Superfund clean-up efforts in this area.*

EPA's Response: The EPA has reviewed the maps provided in the internet links, which were included with the comment. It appears that the planned bridge construction activities will occur adjacent to or over the Lower West Main Canal Lined (LWMCL), Reservoir No. 3 Second Enlargement (West Reservoir or RN3W), and the Northwest Reservoir. Samples were collected from the LWMCL and RN3W during the remedial investigation; however, no samples were collected from the Northwest Reservoir.

The EPA recommends that representatives for the Local Government sponsor contact the EPA's Remedial Project Manager, specified in this Record of Decision, before construction begins on any portion of the reservoir and canal system to determine if any actions are warranted to protect human health and the environment. Also, it is the EPA's understanding that a HCRMA representative has requested to be placed on the Site's mailing list to receive information concerning the Site.

Comment 33: *We are somewhat concerned about the stated "iterative/flexible approach." All the elements of Alternative 6 are critically necessary, and there should be no "flexibility" or wiggle room in replacing the siphon, sealing off the old one, removing the sediment, and performing regular fish removals.*

EPA's Response: After consideration of the public comments received, the EPA has removed references concerning the performance of an iterative/flexible approach from the Record of Decision and will perform the remedial action based on the remedial design.

Comment 34: *On page 11 of the Proposed Plan, the EPA identifies the Siphon as the most likely source of PCB contamination. In the Site History section, on page 5 of the Proposed Plan, the EPA found that "[t]he Siphon at the Arroyo Colorado River was constructed underneath the arroyo approximately in 1926 and replaced the original elevated concrete canal that stretched above the arroyo on concrete pillars." The Donna Irrigation District Hidalgo County Number One owns the canals, reservoir system, and the Siphon. The Irrigation District provided the EPA with substantial information regarding the site's history, including repairs conducted in 1967 to address damage caused by Hurricane Beulah. The Proposed Plan does not make clear why the Irrigation District has not been designated as a potentially responsible party, nor does the EPA appear to have investigated Irrigation District ownership over the years. If the Irrigation District installed the Siphon, the Irrigation District and not the tax payer should be responsible for the cost of the site remediation.*

EPA's Response: The EPA's "enforcement first" policy under the Superfund program requires that the EPA seek potentially responsible parties (PRPs) to fund remedial action(s) at a site. Whenever possible, through administrative and legal actions, the EPA requires PRPs to clean up hazardous sites they have contaminated. The EPA will exhaust its enforcement authority against a PRP(s) before seeking other funding mechanisms.

The EPA has identified the Irrigation District as a PRP through the issuance of a general notice letter. Additionally, the EPA has issued information requests and has extensively reviewed historical information to determine ownership of the reservoir and canal system, including the existing Siphon.

Comment 35: *The EPA has identified specific PCB Congeners at the site. The EPA has identified Aroclor, a trade name for a specific group of PCBs. However, the EPA does not appear to have used this information to find a potentially responsible party for the site contamination.*

EPA's Response: The EPA's "enforcement first" policy under the Superfund program requires that the EPA seek potentially responsible parties (PRPs) to fund remedial action(s) at a site. Whenever possible, through administrative and legal actions, the EPA requires PRPs to clean up hazardous sites they have contaminated.

The EPA has identified the Irrigation District as a PRP through the issuance of a general notice letter. Additionally, the EPA has issued information requests and has extensively reviewed historical documents to determine ownership of the reservoir and canal system, including the existing Siphon. A PRP must fall under one of the four statutory categories of liable parties. These categories include a current owner/operator, past owner/operator, generator, or transporter. The trade name of a specific group of PCBs does not necessarily lead to statutorily responsible parties.

Comment 36: *On page 6, the Proposed Plan states that the Texas Department of Health issued an order in 1994, 24 years ago. This order led to the posting of a sign with the following notice: "Warning, it is illegal to possess fish from this water, fish caught from this water may contain harmful chemicals." The Proposed Plan does not make clear whether this sign or any signs are in place and whether these signs are in Spanish.*

EPA's Response: The sign, in English only, warning that it is illegal to possess fish from the lake was in place during the EPA's latest inspection of the Site, but is uncertain whether this sign is currently posted. The EPA did observe that several signs in several sections of the reservoir and canal system, warning of the risks associated with the consumption of fish, were posted during the EPA's inspection of the Site on May 22, 2018.

Comment 37: *On page 8, the EPA states that fish removals have occurred using electroshocking methods. The EPA proposes no alternative methods for fish removals and does not appear to have received public input on the electroshocking method.*

EPA's Response: Fish removals would be accomplished using electrofishing/shocking methods. During periods where low water conditions exist at the Site, fish accumulate in certain areas and could be removed using seine netting or other applicable methods. Coordination with the Irrigation District would be required to anticipate low water conditions and plan the fish removals. Other fish removal methods (e.g., hoop, fyke, and pound nets, etc.) could be used to supplement the removal efforts. Specific details concerning the fish removals will be determined during the remedial design of the Selected Remedy.

Comment 38: *When conducting fish removal actions, the EPA conducted a public awareness campaign using newspaper and television. The EPA does not list which newspapers or television stations were used. For the benefit of affected community members, the EPA should list the newspapers and televisions stations used and commit to utilizing the same media outlets for future public awareness campaigns.*

EPA's Response: The EPA attempts to utilize local English and Spanish print and television media for any public announcements of planned activities at the Site. The EPA did recently request that the public identify specific local media for the announcement of the release of the Proposed Plan and the date, times, and locations for the Proposed Plan public meetings.

Comment 39: *On page 9 of the Proposed Plan, EPA states that "approximately 42,553 fish were removed from the Site during the five fish removal actions and disposed of at an appropriate landfill." PCB-laden fish are hazardous waste pursuant to CERCLA. Hazardous waste must be disposed of pursuant to the Resource Conservation and Recovery Act ("RCRA"). Yet, in Table 6 of the Proposed Plan, EPA cites to an exemption from RCRA for superfund sites. The Proposed Plan does not make clear whether an "appropriate landfill" is a RCRA permitted landfill or where it is located. Without a guarantee that hazardous waste fish, soil, and the Siphon will be disposed of at a RCRA-permitted landfill, the community may face additional environmental issues resulting from improper disposal.*

EPA's Response: Any wastes generated (i.e., sediment, etc.) because of the Selected Remedy will be analyzed to determine the concentrations of PCBs and will be disposed of in accordance with applicable state and federal standards and regulations for waste disposal at an appropriate permitted landfill. Permitted landfills are designed to segregate waste and prevent exposure of these materials to human and ecological receptors. The specific landfill will be determined during the remedial design or a competitive bid process. Permit exemptions only apply to any actions taken on-site at a specific Superfund site.

Comment 40: *On page 11, EPA details a key finding: the Siphon is the most likely source of the PCB contamination. However, the EPA did not collect samples of the Siphon materials because of "health and safety concerns, technical challenges, and high costs." This conclusory sentence does not fully explain why EPA was not able to collect crucial information in support of its key finding, nor, whether the EPA intends to test the Siphon upon removal to assure that it is the source of the PCB contamination.*

EPA's Response: The EPA may consider the feasibility of obtaining samples from the Siphon's construction materials (i.e., concrete, caulk, grout, or sealants) during the remedial design of the Selected Remedy, foremost considering worker safety and the structural integrity of the Siphon.

Additionally, all options considered for the physical inspection of the interior of the Siphon introduced the potential to damage the structural integrity of the Siphon. The Siphon was constructed in approximately 1926 and it is possible that the concrete and steel used to construct the Siphon may have degraded over time and any direct physical efforts to sample the Siphon could damage the Siphon.

Comment 41: *On page 11, the EPA has included a "Demographics and Cultural Features" section that fails to discuss cultural features. This section is a listing of several demographic factors that can be used to characterize the area as poor, and largely Latin and Spanish speaking. Clearly, the site is used for subsistence and recreational fishing - a fact EPA does not discuss in this section. Local uses for the Donna Reservoir and Canal System are similarly missing from this discussion. Historical value as well as present and past cultural uses and cultural importance, such as uses by Native Americans, are not discussed.*

EPA's Response: The information included in the Demographics and Cultural Features section of the Proposed Plan was developed during the remedial investigation of the Site and is included in the Administrative Record file for the Site. The EPA believes that this information is consistent with the main purpose of the remedial investigation, which is to determine the nature and extent of contamination at the Site.

Also, in the Human Health Risk Assessment, the EPA considered recreational and subsistence fishing during the exposure assessment and developed a Remediation Goal only for a recreational fisher (i.e., for fish tissue). The EPA also developed a Preliminary Remediation Goal for an adult subsistence fisher and determined that removal (i.e., dredging/excavation) of the most heavily contaminated sediment located downgradient of the Siphon's exit, a component of the Selected Remedy, will be protective of an adult subsistence fisher (i.e., within the EPA's acceptable cancer risk range of 10^{-4} to 10^{-6}), which means that an adult subsistence fisher experiencing the reasonable maximum exposure estimate for fish consumption has a 1 in 10,000 chance of developing cancer as a result of Site-related exposure to fish. However, the EPA does not believe that this is a subsistence community and did not consider a final Remediation Goal for this scenario in the Record of Decision.

Comment 42: *Table 6 states: "The U.S. International Boundary Water Commission retains right of approval on all improvements which are to pass over, under or through the walls, levees, improved channel or floodways of U.S. International Boundary and Water Commission Flood Control Projects, including the Rio Grande." The Proposed Plan does not discuss efforts by EPA to coordinate with the IBWC on EPA's chosen Alternative 6, or any public participation allowed at IBWC proceedings. If the IBWC is to approve the final chosen remediation plan, it is crucial for the impacted communities to know whether there is the potential for the IBWC to object to EPA's proposal.*

EPA's Response: Any issues associated with the International Boundary and Water Commission's jurisdiction and their planned work and the EPA's implementation of the Selected Remedy will be considered during the remedial design of the Selected Remedy.

Comment 43: *The EPA recognized the need for institutional controls ("ICs") at the site, however, as proposed, the EPA leaves the door open for ICs that may not provide adequate protection for the community. On page 18, the EPA states that "[t]he IC could consist of either a restrictive covenant or a deed notice." Restrictive covenants affirmatively restrict land uses, while deed notices simply put the owner on notice of site contamination. On page 12, the EPA recognizes at least five colonias by the site. Colonia residents are especially vulnerable to illegitimate real estate developments promising affordable homes. Such real estate developers in Texas have been known to sell homes which sit atop contaminated land, sells homes with no drinking water or sewage connections, or even sell homes with improperly installed on-site sewage facilities (septic tanks). This is not to mention other potential uses, such as building schools, churches, and medical facilities on contaminated soil. This is an intolerable risk for an already vulnerable community. Allowing deed notices as an option leaves the door open for future victimization of affected communities. The EPA should require*

restrictive covenants to affirmatively protect the community from future development at the site.

EPA's Response: The specific details concerning the institutional controls (ICs) to be implemented at the Site will be determined during the remedial design phase of the Selected Remedy. The requirements for filing land use restrictions in the State of Texas are specified in "30 Texas Administrative Code Chapter 350 Subchapter F," under the jurisdiction of the Texas Commission on Environmental Quality (TCEQ).

Comment 44: *My name is [redacted] and I am a retired Border Patrol Agent. I was stationed in Mercedes Station for many years and am very familiar with the Donna lake area. During the late 1990's, I reported an illegal dumping incident in this area to the Texas Natural resource and to the EPA. I never heard anything back from the reported incident. I believe that this dumping source is the cause of pollution for this area. Call me when you get a chance or have an EPA investigator call me. My number is [redacted].*

EPA's Response: The EPA appreciates your interest in the Site and the reporting of the dumping incident. An EPA representative will contact you to discuss this incident.

Comment 45: *These comments are on behalf of the Lower Rio Grande Valley Group of the Sierra Club, and pertain to the EPA remediation plan for the Donna Lake and Canal System Superfund Site. It has been very frustrating and disheartening to see EPA remediations efforts proceed so slowly and episodically over so many years. PCBs were first detected in fish and sediment samples at Donna Lake in 1993, and Donna Lake has been a Superfund site since 2001. Our members strongly urge EPA to move ahead now in a timely and efficient manner. This highly toxic site needs to be cleaned up once and for all so that no more residents are needlessly put in harms way.*

We support EPA's Preferred Alternative 6 (replace siphon, canal dredging/excavation, and fish removals) as it is the most comprehensive alternative for remediation. We have a couple of recommendations to strengthen Alternative 6. First is to conduct fish removal twice yearly, rather then yearly. With fish coming into the canal and lake continually from the Rio Grande, removal once a year is not adequate to guarantee low enough numbers and small enough fish size to protect local residents. Second, community outreach and education efforts need to be strengthened and ongoing. This would be best done by forming a taskforce of local non-profit organizations and community leaders, and providing them a modest budget to better engage and educate the surrounding community about the essential importance of not eating any aquatic organisms from the canal or lake. Just posting signs, as has been shown, is simply not enough. Third, we are somewhat concerned about the stated "iterative/flexible approach." All the elements of Alternative 6 are critically necessary, and there should be no "flexibility" or wiggle room in replacing the siphon, sealing off the old one, removing the sediment, and performing regular fish removals.

As an aside, we could not find the actual plan with detailed descriptions of the Alternatives on the Donna Superfund website, which made submitting a comment much

more difficult than it should have been. This may have decreased the number of online comments that you received. We look forward to the initiation of your remediation work in the near future. Please copy us on any progress report or other communication on this important project.

EPA's Response: The EPA and other State/Federal agencies have been performing investigations at the Site since PCBs were first detected in fish collected from the Site. The Site was placed on the EPA's National Priorities List in March 2008, and the EPA began the remedial investigation of the Site in September 2012. The EPA is now issuing this Record of Decision to address the risks posed by the contaminants discovered at the Site.

The EPA agrees that Alternative 6 (Replace Siphon, Canal Dredging, and Fish Removals) is the most comprehensive alternative to address the contamination at the Site. Additional fish removals, other than those included in the Selected Remedy (i.e., annually for five years), may be performed at the Site when appropriate to meet the Remediation Goal for Total PCBs in fish tissue. As a component of the Selected Remedy, the EPA will consider the formation of an advisory group during the remedial design of the Selected Remedy. The intent for the formation of this group is to work collaboratively with the EPA, and other appropriate entities, in developing and implementing a community involvement program. After consideration of the public comments received, the EPA has removed references concerning the performance of an iterative/flexible approach from the Record of Decision and will perform the remedial action based on the remedial design. Also, the EPA will keep the public informed concerning Site activities through mailings to the Site's mailing list, public notices, and fact sheets.

Comment 46: *I read over the Proposed Plan. Good job! I'm glad to see the preferred option is total replacement.*

EPA's Response: The EPA agrees that Alternative 6 (Replace Siphon, Canal Dredging, and Fish Removals) is the most comprehensive alternative to address the contamination at the Site.

Comment 47: *I am writing in response to the contaminants in Donna Lake. I live in Hidalgo County in the city of Edinburg and have attended presentations about this problem. It is urgent and imperative that this severe problem be resolved.*

I urge the EPA to do Alternative 6. In order to address the threats to human health, this is the best option by far. It is not only the siphon that needs replacing and the contaminants that require removal. We also need you to remove the fish regularly and to monitor this.

The situation is one of "environmental racism" and "environmental justice." We need the government to fix this problem and ensure people cannot continue to be harmed. Our local community is impoverished. People will continue to eat the fish in the lake because

for some people, there is no other food. This is also why information alone does not work in this situation.

Hidalgo County is a unique environment. I love living here, but I also worry about the health and safety of my neighbors. Thank you for your attention to this problem.

EPA's Response: The EPA agrees that Alternative 6 (Replace Siphon, Canal Dredging, and Fish Removals) is the most appropriate alternative to address the contamination at the Site and for the protection of human health and the environment. The specific details concerning the timing and measurable key indicators or monitored parameters to determine the success of the fish removal actions will be determined during the remedial design of the Selected Remedy.

Comment 48: *My vote would be to do nothing. Why should we create a recreational area to where families can enjoy fishing, lets keep the children in the house playing destructive video games where they belong. I hope you see that I am jesting, there is no where close that a family could enjoy an outing without driving to Falcon lake or the gulf. In fact I have noticed other areas that are dug calechi pits that could be made into a small lake for fishing. Ask the fish and game folks their livelihoods depend on fishing license sales. So let's please hurry and fix this problem.*

EPA's Response: The Selected Remedy will include a public outreach and educational program. One of the goals of this program is to reduce the potential risks posed by the consumption of contaminated fish from the Site by coordinating with the local communities to identify an alternate fishing location(s) near the Site, routinely stock this nearby lake/reservoir, and advertise the alternate fishing location. Also, the Remedial Action Objectives stated in the Record of Decision are intended to reduce the contaminant levels found in fish tissue at the Site.

Comment 49: *The Donna Irrigation District shares the desire to protect public health and the environment. The Donna Irrigation District does not know how PCBs were introduced into the Site. The Donna Irrigation District accepts the results of the environmental characterization performed by the EPA except for the assumption that the existing siphon is the source of the PCBs. The Donna Irrigation District supports EPA's plans for institutional and engineering controls (item 1) and performance monitoring (item 6).*

In large part, the District agrees with EPA's plans for public outreach and education (Item 2), with one clarifying comment. The Proposed Plan considers:

> *Reducing the potential risks posed by consumption of contaminated fish from the Site by coordinating with the local communities to identify an alternate fishing location(s) near the Site, routinely stock this nearby lake/reservoir, and advertise the alternate fishing location.*

The consideration quoted above implies that EPA equates fishing in an "alternate fishing location," which one assumes would be on public property, with fishing on the

District's private property. While the Proposed Plan makes a passing reference to the District's "private property," the District would like to see a stronger statement about how accessing the District's canal and reservoir system is trespass.

EPA's Response: The EPA does not have the authority to enforce private property rights and trespass laws. The description of fishing is simply of the activities that have been observed at the Site and not a determination of public versus private access to fishing locations.

Comment 50: *The Donna Irrigation District supports plans for fish removal activities (item 3) and also supports the citizen suggestion made at the Alamo City Public Hearing on May 23, 2018, which recommended performing two fish removal events annually rather than one. The District agrees that this would expedite eliminating contaminated fish from the canal and reservoir system and reduce the potential risk of public exposure.*

The Donna Irrigation District does not fully support the sediment removal plan (item 4), and siphon replacement (item 5) as discussed below.

Regarding the planned sediment removal in the Lower West Main Canal Unlined portion of the canal system downstream of the discharge from the siphon (item 4), the Donna Irrigation District requests the following:

- *In Figure 4, Sediment Remediation Area, the Proposed Plan shows the extent of the area planned for sediment removal. It appears that there is about 1,000 feet of canal distance between the last "clean" sample (clean as defined by EPA as a sample with a PCB concentration that is less than the Cleanup Goal of 0.043 mg/kg) that defines the downstream extent of the remediation area and the next upstream sample that is impacted by PCBs at a concentration greater than 0.043 mg/kg. The Donna Irrigation District requests that the EPA perform additional sediment characterization sampling between these two points with the objective of decreasing the extent of the sediment remediation area and realizing the associated cost savings due to potentially less sediment removal.*

- *The Proposed Plan includes stabilization, transportation and offsite disposal of the estimated 20,000 cubic yards of sediment that is planned to be removed from the canal. The cost estimates in the Feasibility Study Report include $596,589 for onsite stabilization of the sediment with Portland cement, $995,944 for transportation to the landfill (includes transport and driver expenses), and $2,180,692 for disposal at the landfill. The Donna Irrigation District requests that the EPA evaluate modifying the plan to include mixing the removed sediment with Portland cement onsite and placing the material back in the bottom of the canal to form a lining where it could serve as a barrier to infiltration of canal water into the underlying soil. Mixing the removed sediment with Portland cement would alter the sediment in a manner that would limit the bioavailability of the*

PCBs. The PCBs in the cement mixture would not be expected to solubilize into the canal water due to the hydrophobic physical characteristic of PCBs. Additionally, lining the bottom of the canal with the sediment and cement mixture would conserve water in the future by decreasing infiltration into the underlying soil. This modified approach could decrease the cost for implementation of the response action and increase water conservation.

As a variation on this approach of mixing the removed sediment with cement and using the material to line the bottom of the canal where the excavation is performed, the sediment with the greater concentrations of PCBs could be sent for offsite disposal and that portion of sediment with PCB concentrations above the cleanup goal but still relatively low could be used in the sediment-cement mixture for lining the canal bottom.

EPA's Response: Additional fish removals, other than those included in the Selected Remedy (i.e., annually for five years), may be performed at the Site when appropriate to meet the Remediation Goal for Total PCBs in fish tissue.

The EPA will perform confirmation sampling during the dredging/excavation of contaminated sediment to ensure that the Remedial Action Objective for the removal of contaminated sediment is met. Based on confirmation sampling, the extent of contaminated sediment, located downstream of the Siphon's exit, may be more or less than the areal extent identified in the Proposed Plan and this Record of Decision.

Concerning the mixing of the removed sediment with Portland cement and placement in the bottom of the canal "to form a lining where it could serve as a barrier" would not be appropriate for this Site since any barrier could be damaged in the future and pose additional threats and/or actual releases of contaminants. The Irrigation District performs periodic maintenance of the earthen canals (i.e., dredging/excavation of sediment) as the need arises. Periodic maintenance includes removal of soft sediment and material that accumulates on the bottom of the canals. Material is mechanically removed from the canals and placed on the canal levee banks. The Irrigation District performed maintenance in 1990 and 1991 at the Lower West Main Canal Unlined from the Siphon's exit to the Lower West Main Canal Lined. Other maintenance operations may have subsequently occurred as needed during the operation of the reservoir and canal system. According to the Irrigation District, additional maintenance of the reservoir and canal system may also be needed in the future. This maintenance is required to maintain reservoir and canal capacity and flow.

Comment 51: *The Donna Irrigation District disagrees with the EPA's statement that the Donna Irrigation District owns the existing siphon or all of the underlying property. The Donna Irrigation District has extensively researched record title of the property on which the siphon is located, including easements. This information has been provided to EPA in a third supplemental response to EPA's original information request. As part of the International Boundary Water Commission (IBWC) Flood Control Projects, the IBWC obtained floodway easements including portions of the Main Canal from the Cinco*

Check in the south to the Norwood Gate in the north. The IBWC Flood Control Project was necessary for the Federal Floodway System to provide flood relief to the Lower Rio Grande Valley. Facilities located within the floodway area where the IBWC holds easements are controlled by the IBWC. The ownership of any fee title in the IBWC Flood Control Project, including any ownership by Donna Irrigation District, is subject to the IBWC floodway easements. Any exercise of fee ownership rights cannot interfere with the easement rights held by the IBWC. The easements granted for the Floodway System cannot be trespassed upon without permits from the IBWC. As the easements holder, the IBWC is responsible for maintaining the floodway system so as not to interrupt water diverted from the Rio Grande in the floodway area for delivery to the Donna Irrigation District's customers, which includes flow through the siphon and Main Canal. If the siphon somehow interferes with the Donna Irrigation District's delivery of water to its customers, the Donna Irrigation District would have recourse against the IBWC for such interference. However, if the Donna Irrigation District exercised self-help to address such interference without agreement of the IBWC, it would be deemed a trespasser. In summary, the Donna Irrigation District does not own all of the property where the existing siphon is located nor does it own the siphon.

EPA's Response: The EPA continues to proceed with its CERCLA enforcement and determination of appropriate responsible parties for the Site. The EPA will make final determinations on responsible parties when appropriate. The ownership language has been changed in the Record of Decision to reflect the Donna Irrigation District's control of the reservoir and canal system.

Comment 52: *The EPA has concluded that the existing siphon is the likely source of PCBs at the Site. The EPA has stated in the Proposed Plan: "The likely source of PCB contamination at the Site has been determined to be the Siphon, based on an evaluation of the data collected during the RI and by deduction and weight of evidence." This conclusion appears to be based predominately on the limited water sampling conducted inside the siphon and the lack of other potential sources such as PCB containers or electrical equipment. The Donna Irrigation District considers the water sampling and analysis for PCBs inside the siphon to be inconclusive because it was a one-time sampling event with samples collected at two different volumetric flowrates in the siphon. Seven of the samples were collected during a siphon flowrate of 40 cubic feet per second and three of the samples, those with the highest reported PCB concentrations, were collected during a siphon flowrate of 100 cubic feet per second according to Figure 4-31 in the Feasibility Study Report. The EPA has not explained if the increased flowrate in the siphon caused the higher PCB concentrations in the water samples due to increased suspended sediment or other factors. The EPA also has not explained how PCB concentrations in the picograms ($1x10^{-12}$ grams) per liter range in the water could result in PCB concentrations in the sediment at the milligrams ($1x10^{-6}$ grams) per kilogram level.*

EPA's Response: The likely release of PCBs from the Siphon's construction materials (e.g., concrete, caulking, grout, or sealants) to surface water from within the interior of the Siphon occurs slowly but steadily. The water flow rate, be it slow or fast, will not decrease or increase the rate of release of PCBs into the water column. A faster flow

rate may cause the PCB concentrations in surface water to decrease because the relatively constant release rate of PCBs from within the Siphon would be diluted even further. PCBs, being hydrophobic, are not stable in an aqueous environment and are typically not measured in high concentrations in water, which was determined during the remedial investigation of the Site. The issue at the Site is not the rate at which PCBs are being released from the likely source (i.e., the Siphon) into the water column, but the stability and longevity of the PCBs (i.e., do not easily degrade in the environment), their affinity to bioaccumulate, and their toxicity.

The EPA's determination that the likely source of contamination at the Site is the existing Siphon was made based upon the data collected during the remedial investigation and on the weight of evidence. Sediment data collected during remedial investigation initially suggested the following options for the location of the source of PCB contamination at the Site: (1) Between the Siphon's exit and the 90-degree bend in the Lower West Main Canal Unlined in the area with the most elevated concentrations of PCBs in sediment, (2) Immediately upgradient of the Siphon's exit and downgradient of the Main Canal (i.e., in the 160-feet concrete-lined section between the weir and the Siphon's exit), or (3) No longer present at the Site.

The following additional field investigation activities narrowed down the location of the likely source of contamination even further:

- The water-based geophysical survey provided targets for further investigation by the scientific divers in the Lower West Main Canal Unlined. The divers found no indication of PCB-laden objects in the canal, which eliminates Option 1 (i.e., that the source of contamination is in the Lower West Main Canal Unlined).
- Surface water samples collected from within the interior of the Siphon and passive samples collected downgradient of the Siphon's exit indicate that PCBs persist in the water column upon exiting the Siphon and the concentrations within the water column decrease with distance from the Siphon's exit. Therefore; these data indicate that a continuing source of PCB contamination exists at the Site, which eliminates Option 3 (i.e., that a primary source contamination is no longer present at the Site).
- The remote-operated vehicle inspection of the Siphon indicates that no foreign objects which could contain PCBs (e.g., transformers, drums, etc.) are located within the interior of the Siphon.
- The hydraulics of the Siphon indicate that most of the time, a positive pressure is exerted from the interior of the Siphon. Therefore, water would be forced out of cracks or leaking joints in the Siphon and the chances of contamination leaking into the Siphon are low.

Therefore, by weight of evidence from the field investigations, the primary likely source of PCBs at the Site is located within the inverted Siphon and is not a foreign object, as described in Option 2.

Comment 53: *Before proceeding with siphon replacement, it should be conclusively established through further sampling whether the siphon is a source of the PCBs rather than the source being a spill or dumping of a PCB containing liquid into the canal at the siphon outfall. The Donna Irrigation District has noted the EPA's stated intention to implement an iterative/flexible approach to address the uncertainty with the siphon as a source of the PCBs at the Site. The Donna Irrigation District supports EPA's stated approach to implement the sediment and fish removal activities prior to addressing the siphon. If the EPA continues to believe that the siphon is an ongoing source of PCBs, the Donna Irrigation District supports the EPA's stated plan to sample the caulk and sealant on the interior of the siphon to confirm the presence or absence of PCBs before beginning remedial action on the siphon. The Donna Irrigation District takes the position that this sampling is necessary before the EPA proceeds with spending the significant amount of money ($8,100,000 according to the Feasibility Study Report) estimated for the siphon replacement.*

EPA's Response: After consideration of the public comments received, the EPA has removed references concerning the performance of an iterative/flexible approach from the Record of Decision and will perform the remedial action based on the remedial design.

Comment 54: *If further sampling confirms that the existing siphon is the source of the PCBs, the Proposed Plan for siphon replacement includes closure in place of the existing siphon after a new siphon is constructed. The Donna Irrigation District requests that EPA remove the existing siphon rather than closing it in place. Leaving the existing siphon would result in an ongoing potential future liability due to possible future deterioration of the existing siphon and the possible migration of PCBs, if EPA confirms that PCBs are present. If the EPA determines that it is warranted to spend millions of dollars replacing the existing siphon, the Donna Irrigation District requests that the EPA achieve clean closure by removing the existing siphon.*

The IBWC is beginning the process needed to close a gap in its floodway levee intersecting the Donna Irrigation District Lower West Main Canal unlined south of the Norwood Gate, and north of the existing siphon. Under discussion is construction involving the canal area with the highest reported concentrations of PCBs and replacement or extension of the existing siphon. This information has previously been provided to EPA. Donna Irrigation District requests that EPA coordinate closely with the IBWC to ensure consistency, efficiency, and cost savings. If the EPA is planning to construct a new siphon and the IBWC is planning to extend the siphon so that its outfall is outside the boundary of the flood control levees, the most cost-effective approach would be to combine the two projects into one construction event. This approach would support a long-term solution that addresses both environmental and flood control objectives.

EPA's Response: Based on the results of the remedial investigation, the EPA does not believe that the existing Siphon should be completely removed from the Site. Once the Selected Remedy is implemented, the existing Siphon will no longer be in contact with the surface water within the reservoir and canal system and there will be no pathway for

any residual contamination to enter the water. A component of the Selected Remedy is to dewater the Siphon and to completely seal it in place (i.e., by grouting) to prevent exposure to human and ecological receptors. Once grouted in place, there will be no pathway for the PCBs to migrate from the decommissioned Siphon into the reservoir and canal system.

Soil, sediment, and surface water samples were collected near the Siphon, near the Arroyo Colorado River, during the remedial investigation and analyzed for PCBs, among other analytes. The analytical results from samples collected within the Arroyo Colorado River were evaluated in the human health and ecological risk assessments and did not indicate a current unacceptable risk to human or ecological receptors from PCBs. Therefore, the EPA does not expect any unacceptable risks to receptors once the Siphon is grouted in place and decommissioned.

Any issues associated with the International Boundary and Water Commission's jurisdiction and its planned work and the EPA's implementation of the Selected Remedy will be considered during the remedial design of the Selected Remedy.

Comment 55: *The Donna Irrigation District requests that the EPA, and its consultants and contractors, continue to coordinate their activities with the Donna Irrigation District to minimize disruption to its operations. Additionally, if the EPA determines that a remedial action is warranted for the existing siphon and moves forward with the portion of the Proposed Plan to replace the siphon, the Donna Irrigation District requests that the EPA coordinate with the Donna Irrigation District to minimize disruptions in canal system operations. For example, it would be advantageous to perform construction or sediment remediation in the October to December timeframe when typical irrigation water flowrates are relatively lower than during other months of the year.*

EPA's Response: The EPA's collaboration and coordination with the Irrigation District will be important aspects of the remedial actions taken under the Selected Remedy.

Comment 56 (This identical comment was received separately by approximately fifty individuals from several cities): *I am a resident of Alamo, Texas (several cities were included with this comment). I am concerned about the PCB contamination of the Donna Lake Superfund Site. I support the suggested solution (Alternative 6) but believe it can be improved. I stand along community members advocating for the following to be included in the Record of Decision:*

1. *PCB testing for residents concerned about potential contamination,*
2. *The creation of a community work group to advise concerning public outreach and education, and*
3. *Conduct fish removals twice a year for five years.*

Thank you for your consideration and let's work together to clean up the Donna Lake.

Sincerely, (Several individuals included this identical comment).

EPA's Response: The EPA does not have the authority to conduct such testing. Blood testing of residents is a function of the local county/state health departments and the TDSHS. The EPA recommends that concerned individuals contact these entities to determine the blood testing options that are available to them.

As a component of the Selected Remedy, the EPA will consider the formation of an advisory group during the remedial design of the Selected Remedy. The intent for the formation of this group is to work collaboratively with the EPA, and other appropriate entities, in developing and implementing a community involvement program.

Additional fish removals, other than those included in the Selected Remedy (i.e., annually for five years), may be performed at the Site when appropriate to meet the Remediation Goal for Total PCBs in fish tissue. The specific details concerning the timing and measurable key indicators or monitored parameters to determine the success of the fish removal actions will be determined during the remedial design of the Selected Remedy.

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TABLES

Table 1

Measurement Endpoints for Ecological Risk Assessment

Assessment Endpoint	Measurement Endpoint	On Site-Measurements/Exposure Point Concentrations (EPC)	Evaluation Method	Risk Indicators
Protection of terrestrial plant viability from impacts of COPCs in surface soil	Initial screening.	• Maximum surface soil concentrations measured at site in past and more recent sampling.	• Direct comparison to the TCEQ ecological screening levels (2014) to define COPCs.	• Chemicals defined as COPCs indicate the potential for risk.
	Comparison of surface soil concentrations to benchmarks.	• Maximum and 95% UCL mean surface soil concentrations measured at site in past and more recent sampling.	• Direct comparison of maximum surface soil concentrations to plant benchmarks (TRVs). • Direct comparison of mean surface soil concentrations and individual concentrations against TRVs. • Plant benchmarks from 1) USEPA EcoSSLs 2) ORNL benchmarks (Efroymson et al. 1997a).	• Exceedance of benchmarks indicates potential for risks.
	Comparison of surface soil concentrations to background surface soil concentrations.	• Maximum and 95% UCL mean surface soil concentrations measured at site in past and more recent sampling.	• Direct comparison to background concentrations.	• Exceedance of background indicates contaminants are not naturally occurring or widely distributed across the entire area. • Exceedance of benchmarks and background indicates a more certain potential for risk.
Protection of soil invertebrates exposed to COPCs in surface soil from adverse survival, growth and reproductive effects	Initial screening.	• Maximum surface soil concentrations measured at site in past and more recent sampling.	• Direct comparison to the TCEQ ecological screening levels (2014) to define COPCs.	• Chemicals defined as COPCs indicate the potential for risk.
	Comparison of surface soil concentrations to benchmarks.	• Maximum and 95% UCL mean surface soil concentrations measured at site in past and more recent sampling.	• Direct comparison of maximum surface soil concentrations to invertebrate benchmarks. • Direct comparison of mean surface soil concentrations and individual concentrations to invertebrate benchmarks. • Invertebrate benchmarks from 1) USEPA EcoSSLs 2) ORNL benchmarks (Efroymson et al. 1997b).	• Exceedance of benchmarks indicates potential for risks.
	Comparison of surface soil concentrations to background surface soil concentrations.	• Maximum and 95% UCL mean surface soil concentrations measured at site in past and more recent sampling.	• Direct comparison to background concentrations.	• Exceedance of background indicates contaminants are not naturally occurring or widely distributed across the entire area. • Exceedance of benchmarks and background indicates a more certain potential for risk.

Table 1

Measurement Endpoints for Ecological Risk Assessment

Assessment Endpoint	Measurement Endpoint	On Site-Measurements/Exposure Point Concentrations (EPC)	Evaluation Method	Risk Indicators
Protection of benthic invertebrates and aquatic organisms exposed to COPCs in sediment and surface water from adverse survival, growth and reproductive effects	Initial screening.	• Maximum sediment and surface water concentrations measured at site in past and more recent sampling.	• Direct comparison to the TCEQ ecological screening levels (2014) to define COPCs.	• Chemicals defined as COPCs indicate the potential for risk.
	Comparison of sediment and surface water concentrations to benchmarks.	• Maximum and 95% UCL mean sediment and surface water concentrations measured at site in past and more recent sampling.	• Compare maximum, mean, and individual sediment concentrations against benthic TRVs (consensus based benchmarks from literature-based studies). • Compare maximum, mean, and individual surface water concentrations against aquatic TRVs (consensus based benchmarks from literature-based studies).	• Exceedance of benchmarks indicates potential for risks.
	Comparison of surface water and sediment concentrations to background surface water and sediment concentrations.	• Maximum and 95% UCL mean surface water and sediment concentrations measured at site in past and more recent sampling.	• Direct comparison to background concentrations.	• Exceedance of background indicates contaminants are not naturally occurring or widely distributed across the entire area. • Exceedance of benchmarks and background indicates a more certain potential for risk.
Protection of terrestrial mammals and birds to ensure that ingestion of COPCs in surface soil, surface water, and plants/prey do not have unacceptable impacts on survival, growth, and reproduction	Initial screening.	• Surface soil and surface water concentrations measured at site in past and more recent sampling.	• Direct comparison to the TCEQ ecological screening levels (2014) to define COPCs.	• Chemicals defined as COPCs indicate the potential for risk.
	Comparison of modeled food web doses to benchmarks.	• Maximum and 95% UCL mean surface soil and surface water concentrations measured at site in past and more recent sampling. • Maximum and 95% UCL mean food item tissue concentrations modeled using literature-based equations. • Maximum and 95% UCL mean ingested dose based on literature-based exposure factors and uptake equations.	• Calculate maximum case scenario doses using food web models and compare to no- and low-effects benchmarks. • Calculate mean case scenario doses and compare to no- and low-effects benchmarks. • Mammal and bird dose-based benchmarks from 1) USEPA EcoSSL 2) ORNL benchmarks (Sample et al. 1998) 3) Additional literature-based sources as relevant.	• Exceedance of benchmarks indicates a potential for risks. • Exceedance of low-effects benchmarks indicates a more certain potential for risks.
	Comparison of surface soil and surface water concentrations to background surface soil and surface water concentrations.	• Maximum and 95% UCL mean surface soil and surface water concentrations measured at site in past and more recent sampling	• Direct comparison to background concentrations.	• Exceedance of both benchmarks and background indicates a more certain potential for risks.

Table 1

Measurement Endpoints for Ecological Risk Assessment

Assessment Endpoint	Measurement Endpoint	On Site-Measurements/Exposure Point Concentrations (EPC)	Evaluation Method	Risk Indicators
Protection of aquatic-feeding mammals and birds, to ensure that ingestion of COPCs in sediment, surface water, and food do not have adverse impacts on survival, growth, and reproduction	Initial screening.	• Maximum sediment and surface water concentrations measured at site in past and more recent sampling.	• Direct comparison to the TCEQ ecological screening levels (2014) to define COPCs.	• Chemicals defined as COPCs indicate the potential for risk.
	Comparison of modeled food web doses to benchmarks.	• Sediment and surface water concentrations measured at site in past and more recent sampling - SLERA: Maximum Concentrations - Refined SLERA & BRAPF: Mean Concentrations • Aquatic food item tissue concentrations modeled using literature-based equations - SLERA: Maximum Concentrations - Refined SLERA & BRAPF: Mean Concentrations • Ingested dose based on literature-based exposure factors and uptake equations - SLERA: Maximum Dose - Refined SLERA & BRAPF: Mean Dose	• Calculate maximum case scenario doses using food web models and compare to no-effects benchmarks. • Calculate mean case scenario doses and compare to no- and low-effects benchmarks. • Bird dose-based benchmarks from 1) USEPA EcoSSL 2) ORNL benchmarks (Sample et al. 1998) 3) Additional literature-based sources as relevant.	• Exceedance of benchmarks indicates a potential for risks. • Exceedance of low-effects benchmarks indicates a more certain potential for risks.
	Comparison of surface water and sediment concentrations to background surface water and sediment concentrations.	• Sediment and surface water concentrations measured at site and in background areas - Refined SLERA & BRAPF: Maximum and Mean Concentrations • Plant food item tissue concentrations modeled using literature-based equations - Refined SLERA & BRAPF: Maximum and Mean Concentrations • Ingested dose based on literature-based exposure factors and uptake equations - Refined SLERA & BRAPF: Maximum and Mean Dose	• Compare maximum and mean case scenario doses on-site to doses calculated for background areas.	• Exceedance of both benchmarks and background indicates a more certain potential for risks.
Protection of reptiles and amphibians to ensure that ingestion of COPCs in surface soil, sediment, surface water, and prey do not have unacceptable impacts on survival, growth, and reproduction	Comparison of modeled food web doses to benchmarks.	• EPCs evaluated for other receptors.	• Evaluate whether other wildlife receptors are at risk and consider results as surrogate for reptiles.	• Risks from COPCs to other receptors indicate that there may be a risk to reptiles and amphibians from the same COPCs.

Table 2

Threatened and Endangered Species that may be found in Hidalgo County

Common Name	Scientific Name	Federal Status	State Status	Surrogate Species
Birds				
American Peregrine Falcon	*Falco peregrinus anatum*	Delisted	Threatened	red-tailed hawk
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	Delisted		red-tailed hawk
Cactus Ferruginous Pygmy-Owl	*Glaucidium brasilianum cactorum*		Threatened	red-tailed hawk
Common Black-Hawk	*Buteogallus anthracinus*		Threatened	laughing gull
Gray Hawk	*Asturina nitid/Buteo nitidus*		Threatened	red-tailed hawk
Interior Least Tern	*Sterna antillarum athalassos*	Endangered	Endangered	belted kingfisher
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Endangered	Endangered	red-tailed hawk
Northern Beardless-Tyrannulet	*Camptostoma imberbe*		Threatened	American robin
Peregrine Falcon	*Falco peregrinus*	Delisted	Threatened	red-tailed hawk
Reddish Egret	*Egretta rufescens*		Threatened	great blue heron
Rose-throated Becard	*Pachyramphus aglaiae*		Threatened	American robin
Sprague's Pipit	*Anthus spragueii*	Candidate for listing		American robin
Texas Botteri's Sparrow	*Aimophila botterii texana*		Threatened	American robin
Tropical Parula	*Parula pitiayumi*		Threatened	American robin
White-faced Ibis	*Plegadis chihi*		Threatened	laughing gull
White-tailed Hawk	*Buteo albicaudatus*		Threatened	red-tailed hawk
Wood Stork	*Mycteria americana*		Threatened	laughing gull
Zone-tailed Hawk	*Buteo albonotatus*		Threatened	red-tailed hawk

Table 2

Threatened and Endangered Species that may be found in Hidalgo County

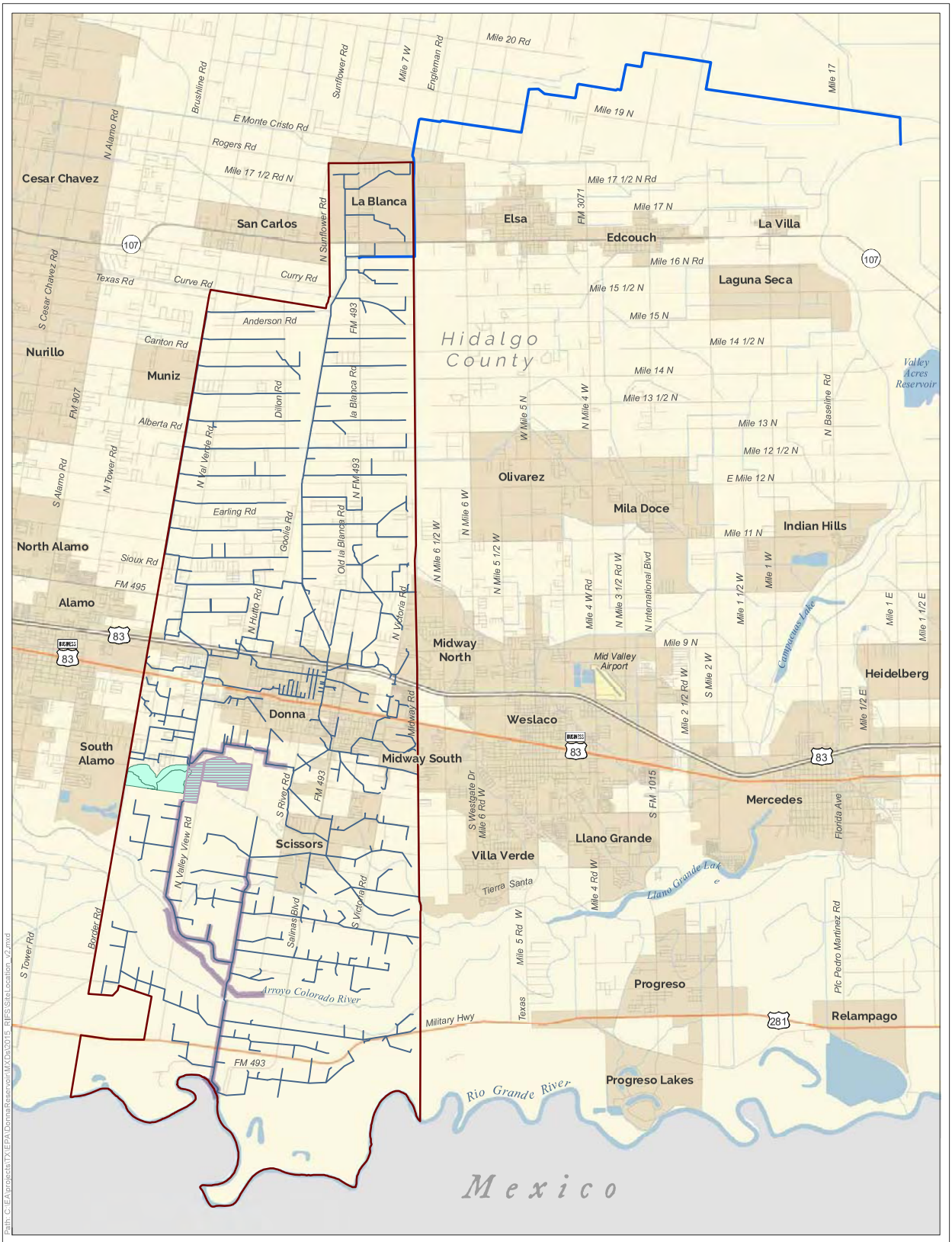
Common Name	Scientific Name	Federal Status	State Status	Surrogate Species
Mammals				
Coues' rice rat	*Oryzomys couesi*		Threatened	raccoon
Jaguar	*Panthera onca*	Endangered	Endangered	coyote
Jaguarundi	*Herpailurus yaguarondi*	Endangered	Endangered	coyote
Ocelot	*Leopardus pardalis*	Endangered	Endangered	coyote
Southern yellow bat	*Lasiurus ega*		Threatened	least shrew
White-nosed coati	*Nasua narica*		Threatened	least shrew
Reptiles				
Black-striped snake	*Coniophanes imperialis*		Threatened	diamondback water snake
Northern cat-eyed snake	*Leptodeira septentrionalis septentrionalis*		Threatened	diamondback water snake
Reticulate collared lizard	*Crotaphytus reticulatus*		Threatened	diamondback water snake
Speckled racer	*Drymobius margaritiferus*		Threatened	diamondback water snake
Texas horned lizard	*Phrynosoma cornutum*		Threatened	diamondback water snake
Texas indigo snake	*Drymarchon melanurus erebennus*		Threatened	diamondback water snake
Texas tortoise	*Gopherus berlandieri*		Threatened	diamondback water snake

Table 2

Threatened and Endangered Species that may be found in Hidalgo County

Common Name	Scientific Name	Federal Status	State Status	Surrogate Species
Amphibians				
Black-spotted newt	*Notophthalmus meridionalis*		Threatened	American Bullfrog
Mexican Treefrog	*Smilisca baudinii*		Threatened	American Bullfrog
Sheep frog	*Hypopachus variolosus*		Threatened	American Bullfrog
South Texas siren (large form)	*Siren sp 1*		Threatened	American Bullfrog
White-lipped frog	*Leptodactylus fragilis*		Threatened	American Bullfrog
Plants				
Star cactus	*Astrophytum asterias*	Endangered	Endangered	multiple species of terrestrial plants
Texas ayenia	*Ayenia limitaris*	Endangered	Endangered	
Walker's manioc	*Manihot walkerae*	Endangered	Endangered	
Fish				
Rio Grande silvery minnow	*Hybognathus amarus*	Endangered	Endangered	aquatic life criteria protective of sensitive species will be utilized
River goby	*Awaous banana*		Threatened	
Mollusks				
False spike mussel	*Quadrula mitchelli*		Threatened	sediment quality criteria protective of sensitive species will be utilized
Salina mucket	*Potamilus metnecktayi*		Threatened	
Texas hornshell	*Popenaias popeii*	Candidate for listing	Threatened	

FIGURES



Legend

- Canal/River Area Under Investigation
- Portion of Donna Reservoir Under Investigation
- Irrigation Network
- Donna Irrigation District - Hidalgo County No. 1
- Donna Reservoir
- Donna Drain

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, US Census Bureau 2016, USGS 2014

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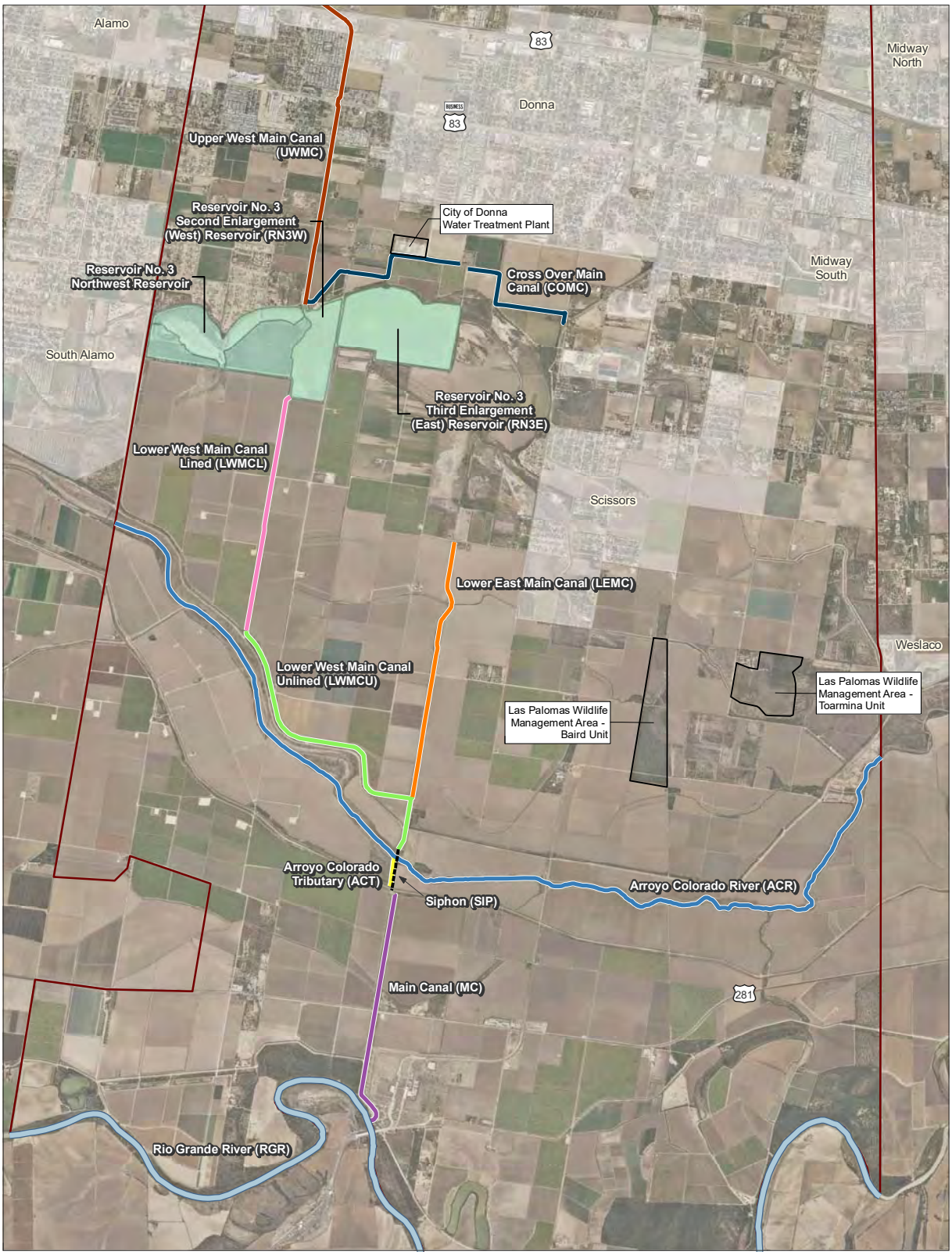
Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 1.
Site Location

June, 2017

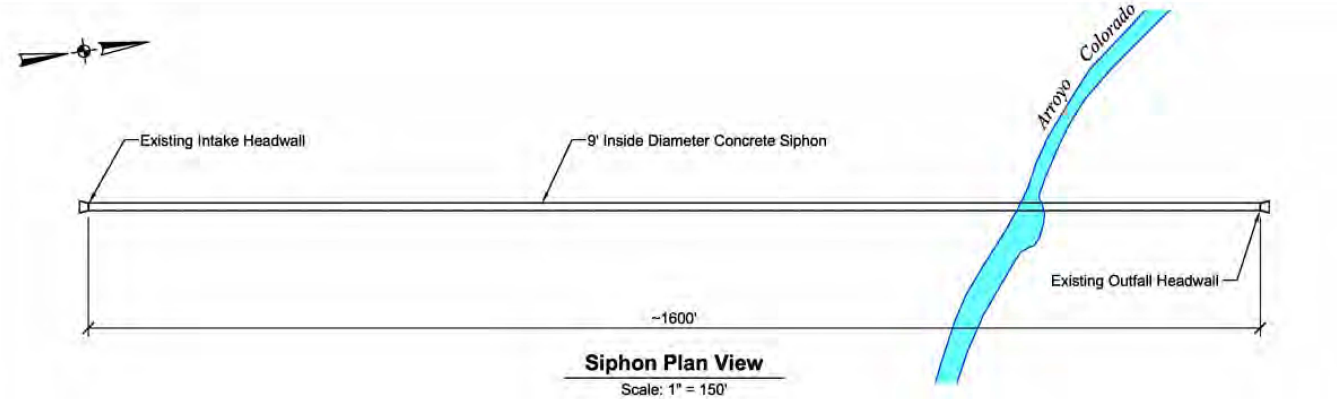
Path: C:\EA projects\TX\EPA\DonnaReservoirMX\Da\2015_RIFS\SiteLocation_v2.mxd

000758

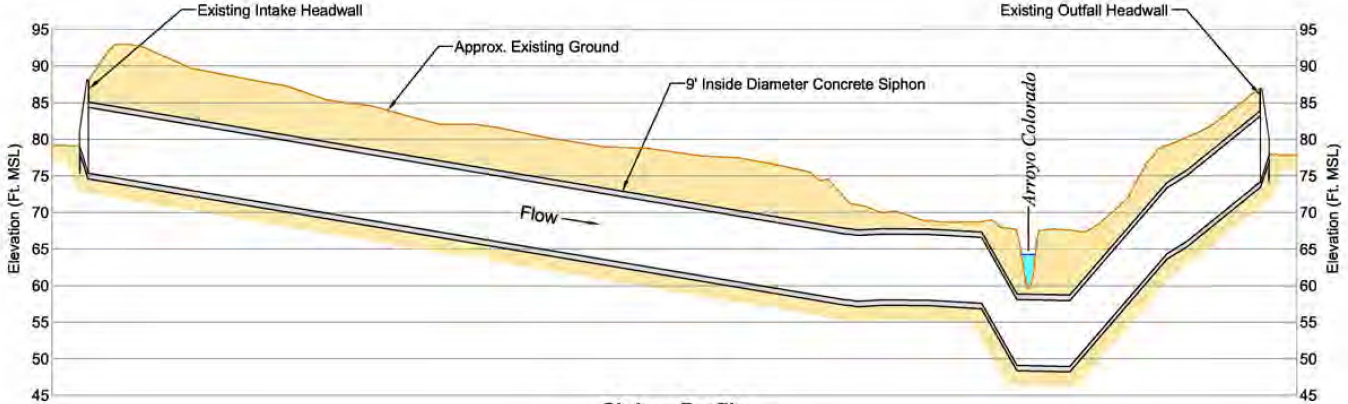


Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 2
Site Layout

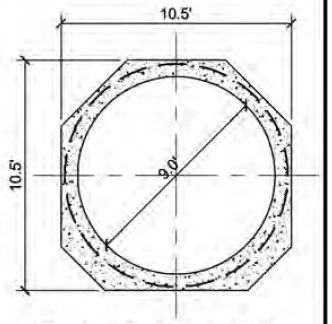


Siphon Plan View
Scale: 1" = 150'



Siphon Profile
Scale: 1" = 150' Horiz.; 1" = 15' Vert.
(10X Vertical Exaggeration)

Siphon Profile
Scale: 1" = 150' Vert. & Horiz.
(No Vertical Exaggeration)



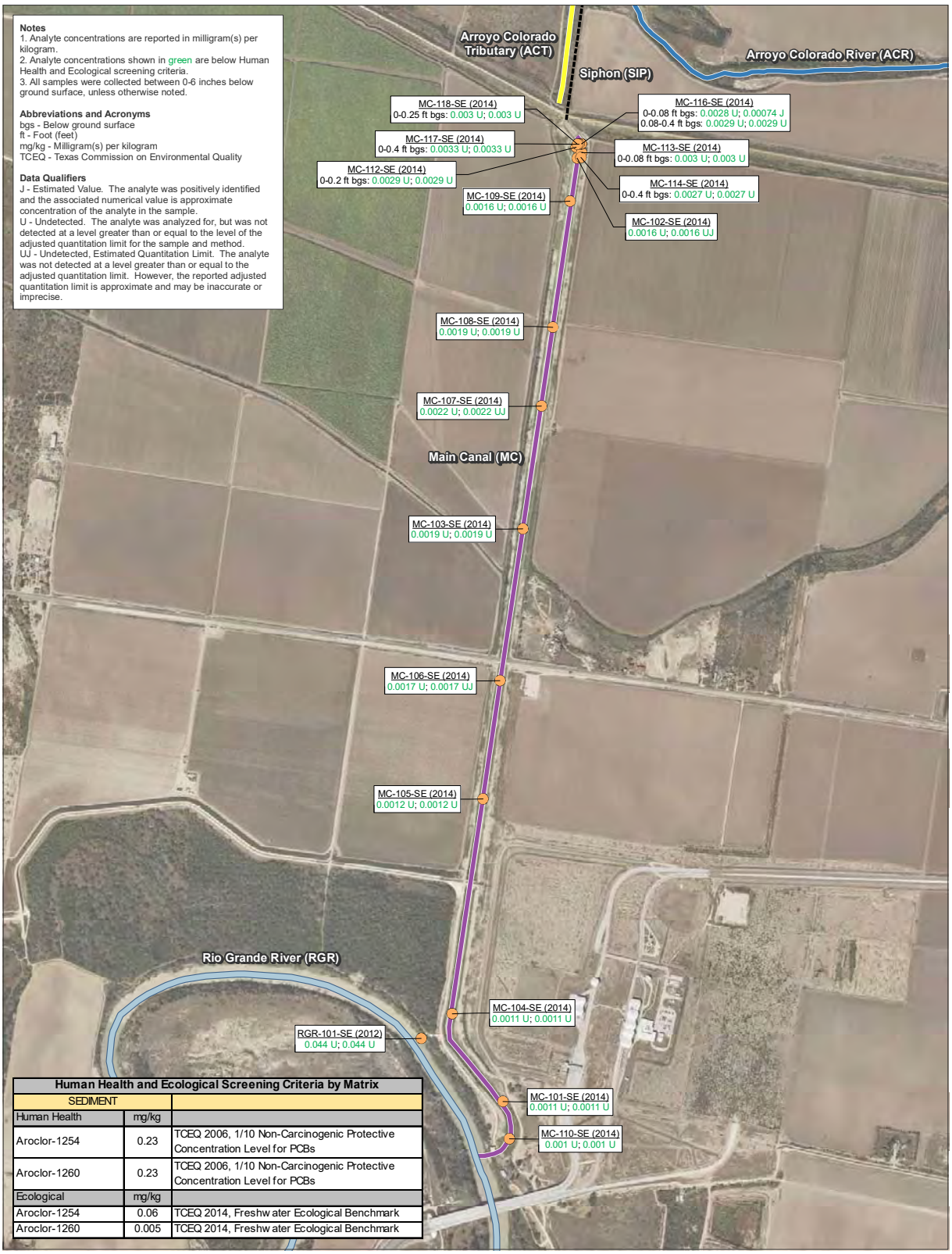
Typical Siphon Section
Scale: 1" = 5'

Note:
This figure has been adopted from:
URS Corporation. 2006. *Feasibility Study Report, Donna Reservoir and Canal System, Donna Hidalgo County, Texas.* Prepared for the Texas Commission on Environmental Quality. June.

The siphon plan, profile, and sections shown on this drawing are based on historic siphon drawings from the report *Inverted Siphon Inspection by Remotely Operated Vehicle* (ASI Marine, 2001), and from construction plans entitled *Rehabilitation of Irrigation Facilities - First Lift Main Canal* prepared by Sigler, Clark & Associates, Weslaco, Texas and dated July 1961. The accuracy of the historic siphon drawings has not been verified and all information is approximate and should not be used for design purposes.

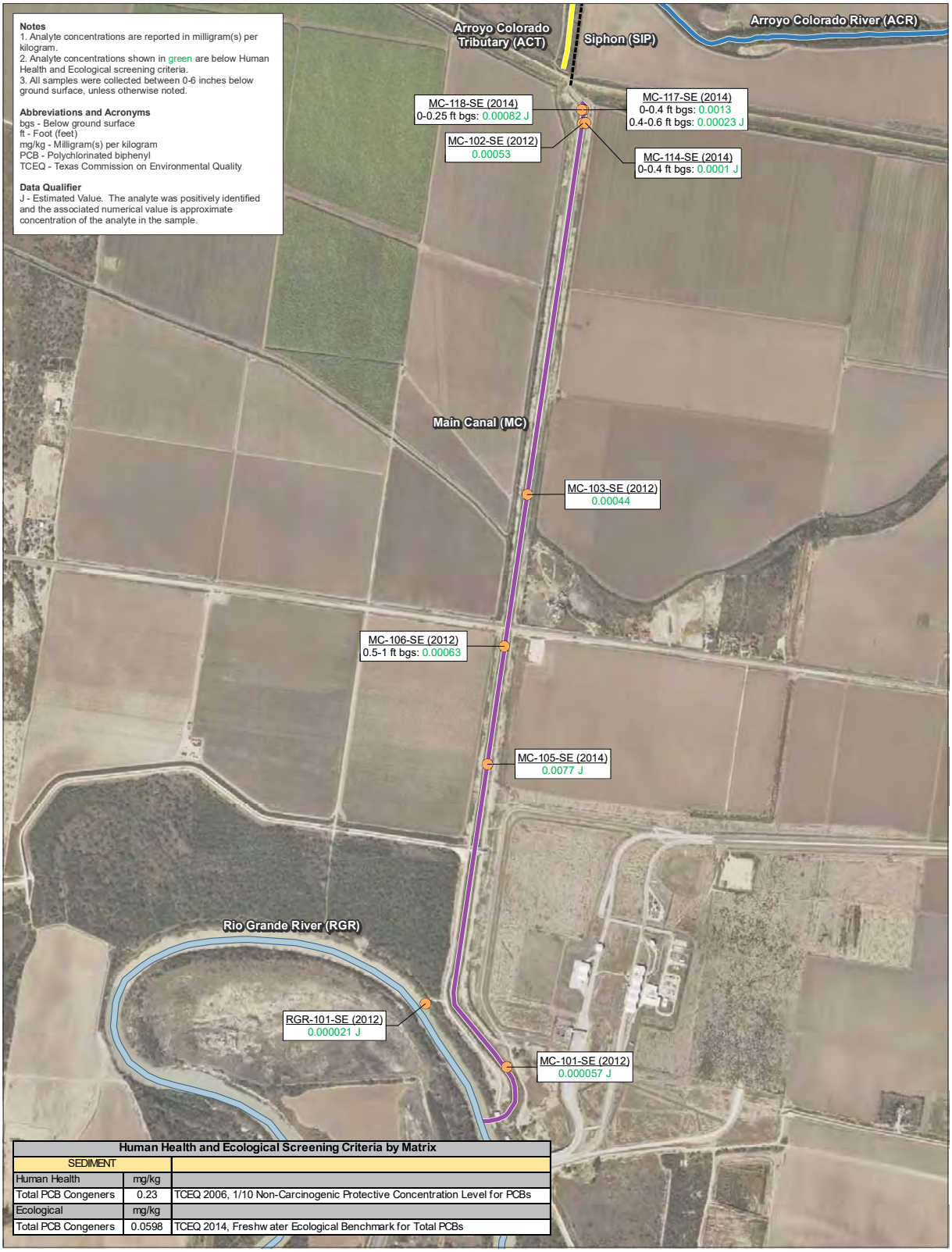
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 3
Existing Siphon
Plan, Profile, and Sections



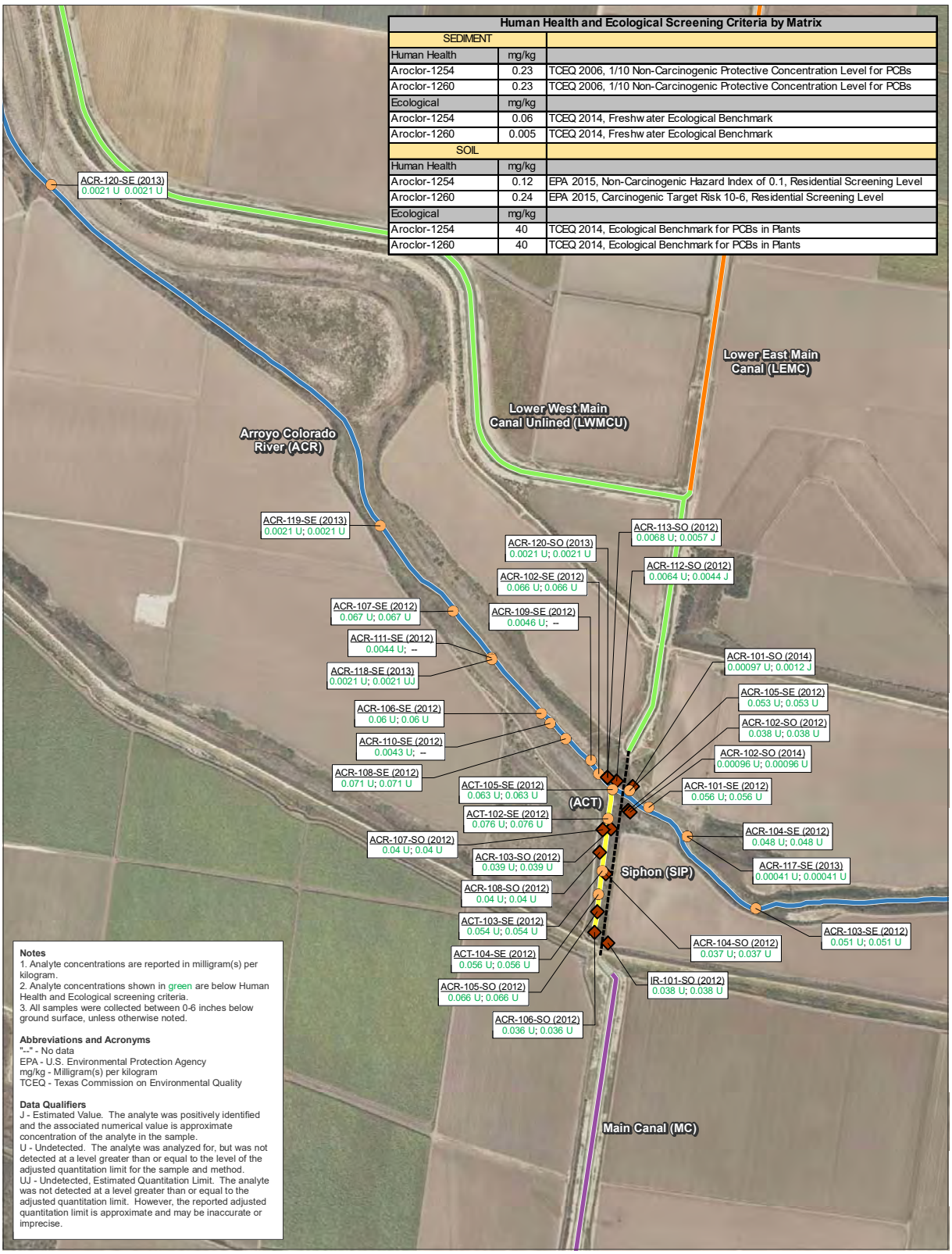
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 4
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment in the Main Canal and Rio Grande River



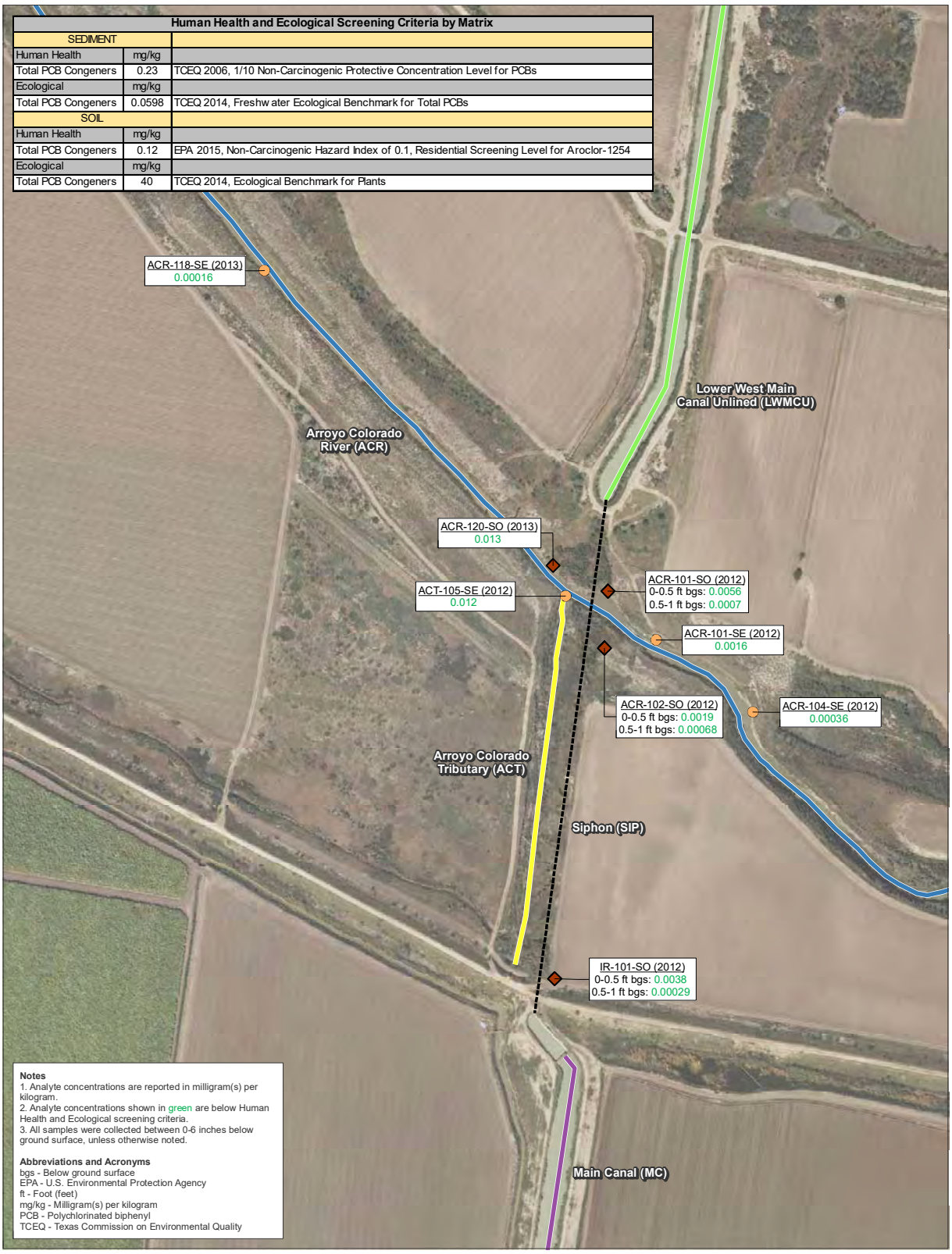
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 5
Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment in the Main Canal and Rio Grande River



Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 6
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment and Soil in the Arroyo Colorado River and Tributary



Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

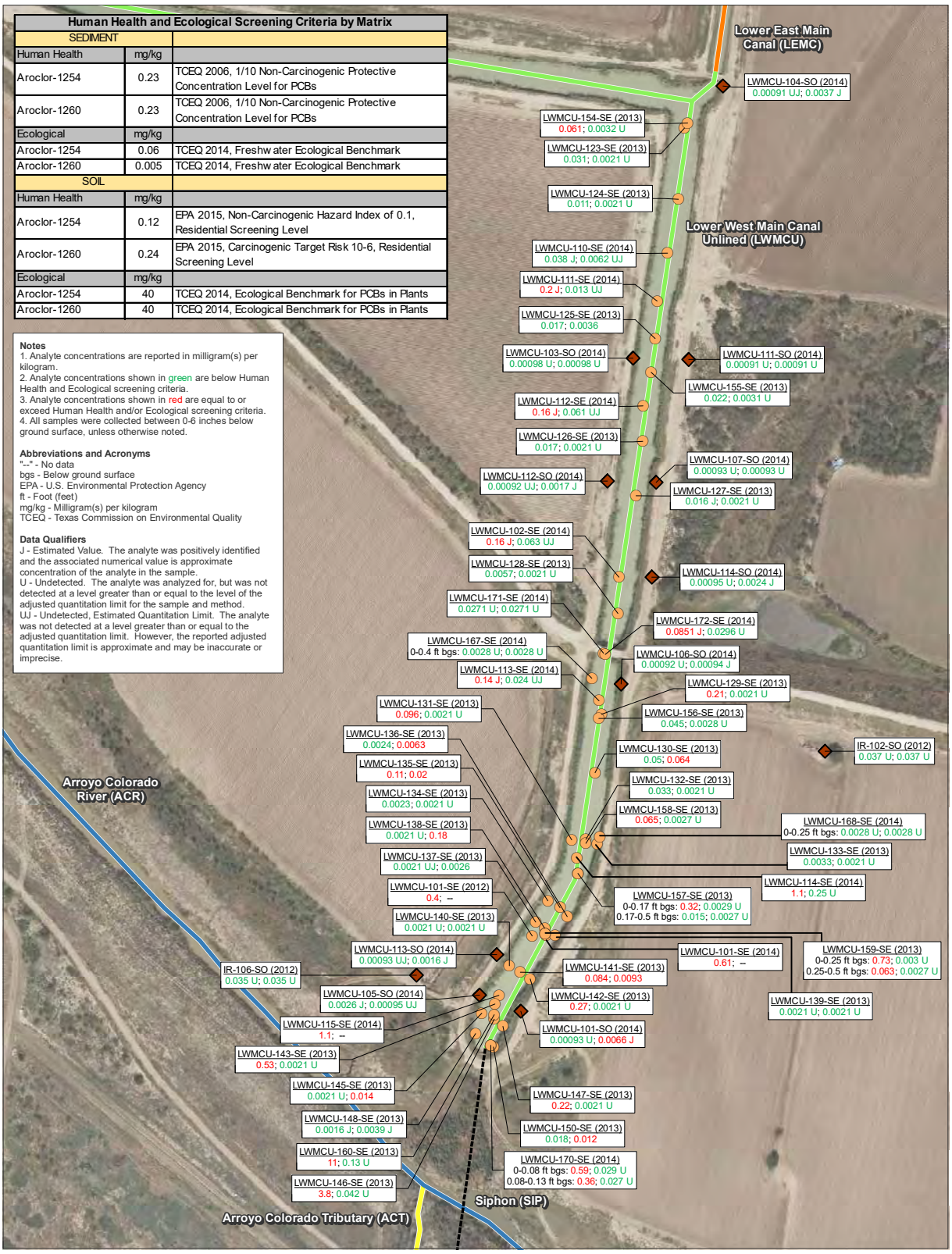
Figure 7
Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment and Soil in the Arroyo Colorado River and Tributary

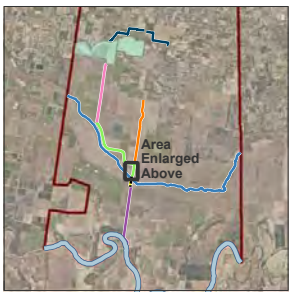
Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshwater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshwater Ecological Benchmark
SOIL		
Human Health	mg/kg	
Aroclor-1254	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level
Aroclor-1260	0.24	EPA 2015, Carcinogenic Target Risk 10-6, Residential Screening Level
Ecological	mg/kg	
Aroclor-1254	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants
Aroclor-1260	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. Analyte concentrations shown in red are equal to or exceed Human Health and/or Ecological screening criteria.
4. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
"--" - No data
bgs - Below ground surface
EPA - U.S. Environmental Protection Agency
ft - Foot (feet)
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.





Legend
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)

Sample Locations by Matrix
- Sediment
- Soil

Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results (Exceedances in red)

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 100 200
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

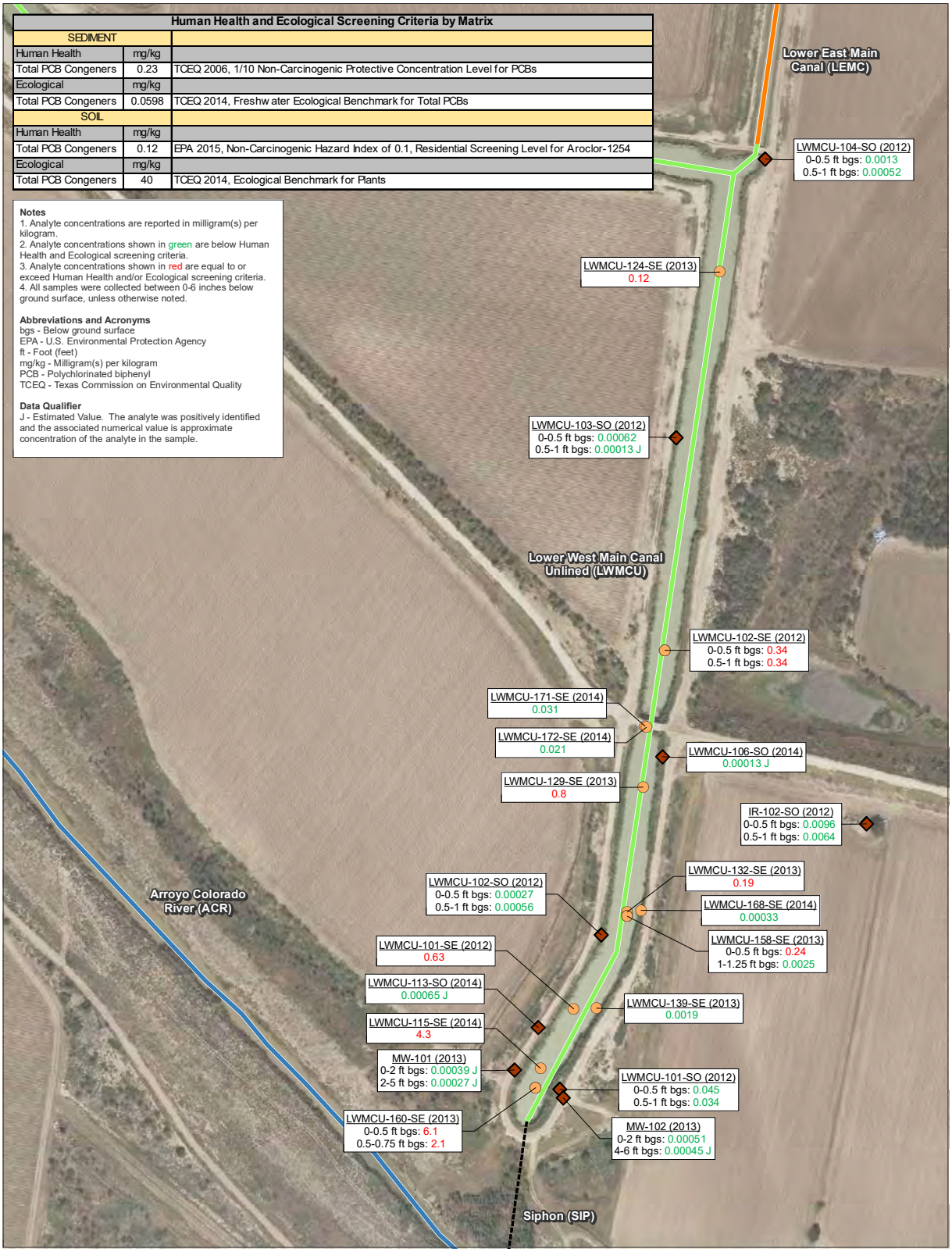
Figure 8
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment and Soil in the Lower West Main Canal Unlined South of 90 Degree Bend

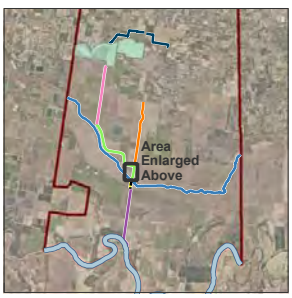
Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Total PCB Congeners	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Total PCB Congeners	0.0598	TCEQ 2014, Freshwater Ecological Benchmark for Total PCBs
SOIL		
Human Health	mg/kg	
Total PCB Congeners	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level for Aroclor-1254
Ecological	mg/kg	
Total PCB Congeners	40	TCEQ 2014, Ecological Benchmark for Plants

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. Analyte concentrations shown in red are equal to or exceed Human Health and/or Ecological screening criteria.
4. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
bgs - Below ground surface
EPA - U.S. Environmental Protection Agency
ft - Foot (feet)
mg/kg - Milligram(s) per kilogram
PCB - Polychlorinated biphenyl
TCEQ - Texas Commission on Environmental Quality

Data Qualifier
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.





Legend
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Siphon (Underground)

Sample Locations by Matrix
- Sediment
- Soil

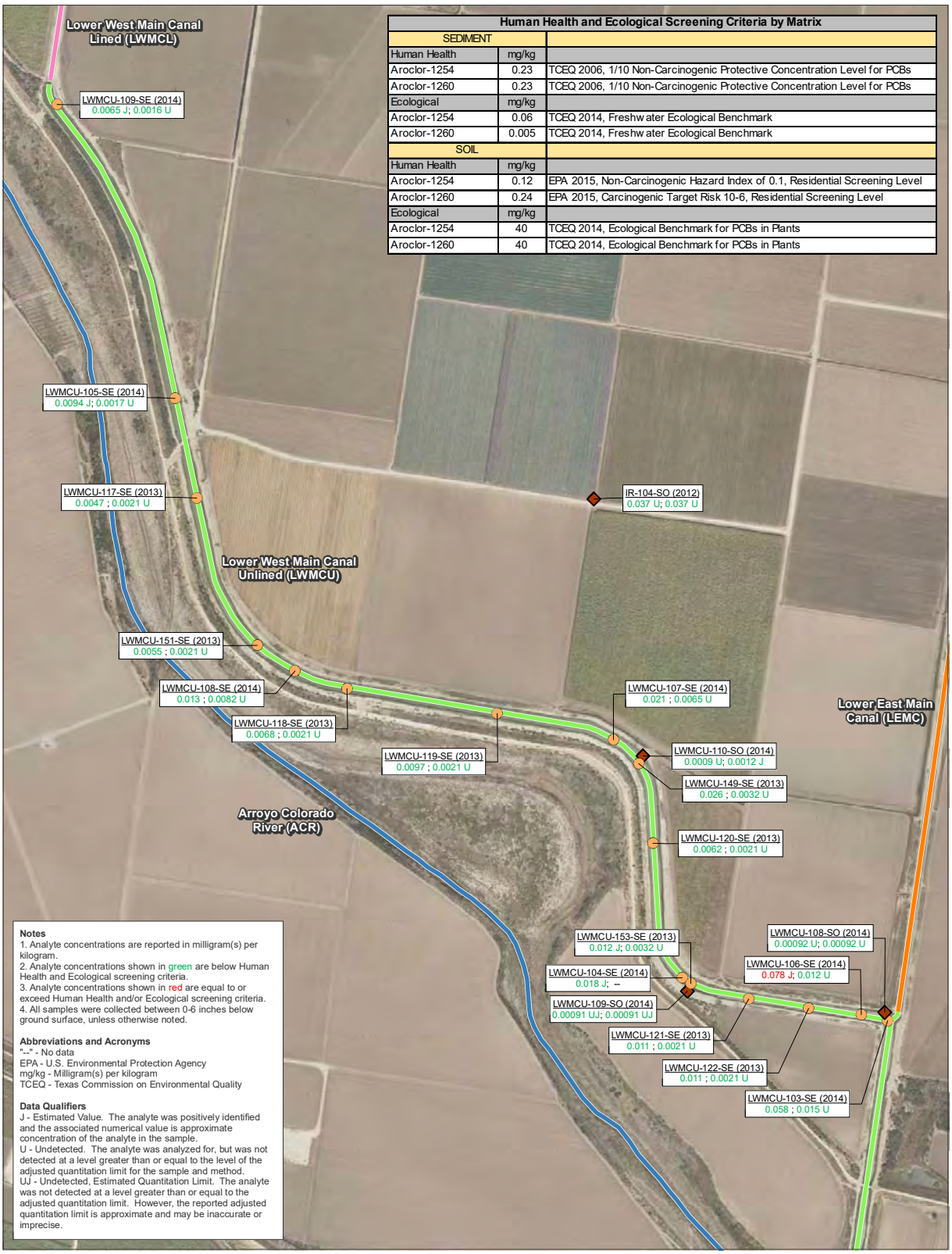
Sample Identification
Sample Depth (if multiple depths): Total PCB Congener Results (Exceedances in red)

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 100 200
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 9
Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment and Soil in the Lower West Main Canal Unlined South of 90 Degree Bend

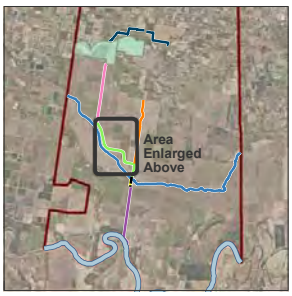


Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshwater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshwater Ecological Benchmark
SOIL		
Human Health	mg/kg	
Aroclor-1254	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level
Aroclor-1260	0.24	EPA 2015, Carcinogenic Target Risk 10-6, Residential Screening Level
Ecological	mg/kg	
Aroclor-1254	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants
Aroclor-1260	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. Analyte concentrations shown in red are equal to or exceed Human Health and/or Ecological screening criteria.
4. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
"--" - No data
EPA - U.S. Environmental Protection Agency
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.



Legend
- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River

Sample Locations by Matrix
- Sediment
- Soil

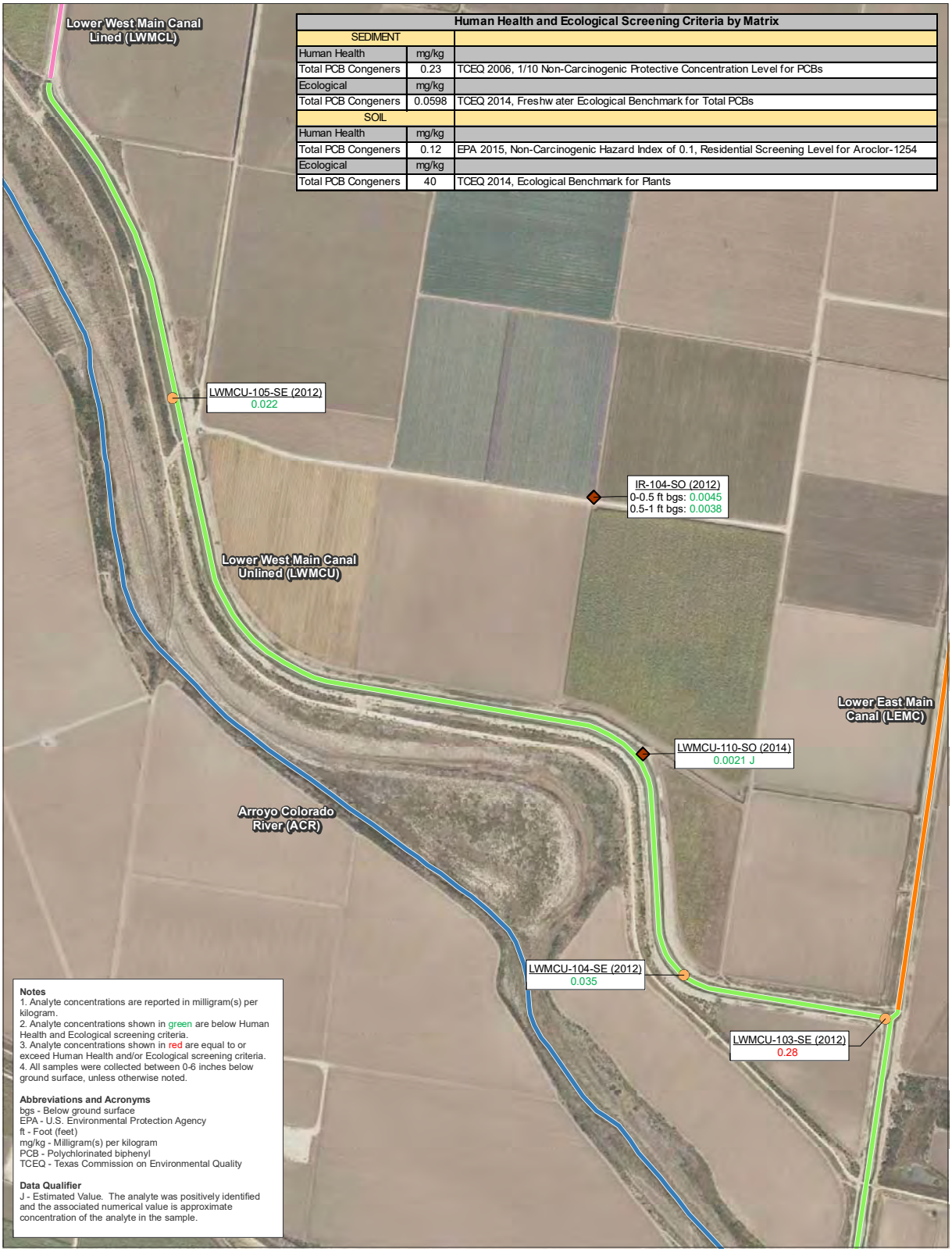
Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results (Exceedances in red)

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 500 1,000
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 10
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment and Soil in the Lower West Main Canal Unlined North of 90 Degree Bend

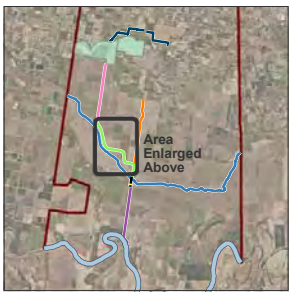


Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Total PCB Congeners	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Total PCB Congeners	0.0598	TCEQ 2014, Freshw ater Ecological Benchmark for Total PCBs
SOIL		
Human Health	mg/kg	
Total PCB Congeners	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level for Aroclor-1254
Ecological	mg/kg	
Total PCB Congeners	40	TCEQ 2014, Ecological Benchmark for Plants

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. Analyte concentrations shown in red are equal to or exceed Human Health and/or Ecological screening criteria.
4. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
bgs - Below ground surface
EPA - U.S. Environmental Protection Agency
ft - Foot (feet)
mg/kg - Milligram(s) per kilogram
PCB - Polychlorinated biphenyl
TCEQ - Texas Commission on Environmental Quality

Data Qualifier
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.



Legend
- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River

Sample Locations by Matrix
- Sediment
- Soil

Sample Identification
Sample Depth (if multiple depths): Total PCB Congener Results (Exceedances in red)

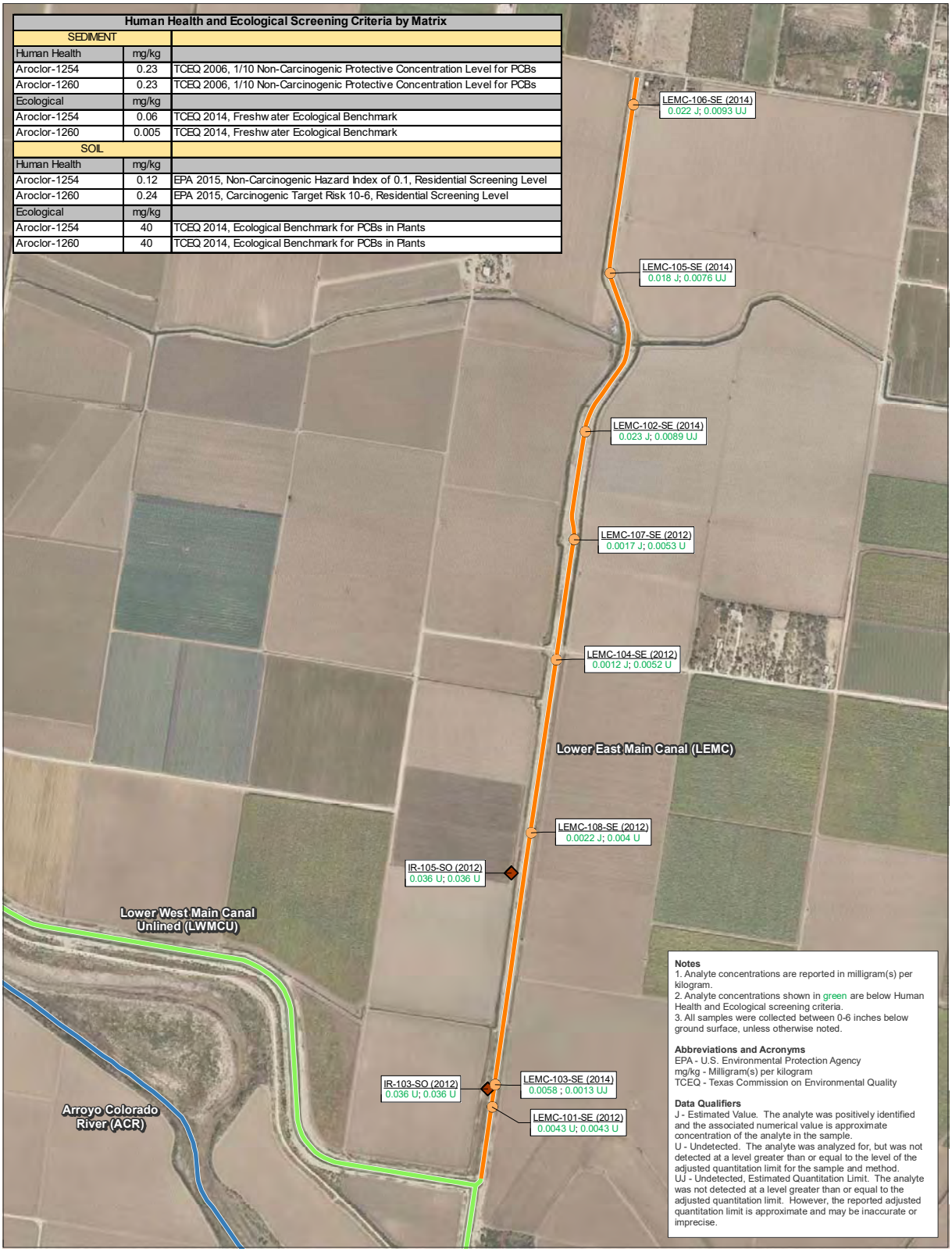
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 500 1,000
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 11
Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment and Soil in the Lower West Main Canal Unlined North of 90 Degree Bend

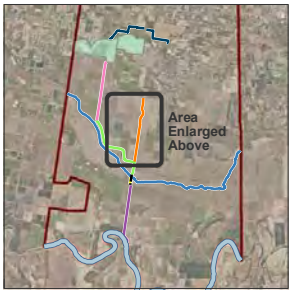
Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshwater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshwater Ecological Benchmark
SOIL		
Human Health	mg/kg	
Aroclor-1254	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level
Aroclor-1260	0.24	EPA 2015, Carcinogenic Target Risk 10-6, Residential Screening Level
Ecological	mg/kg	
Aroclor-1254	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants
Aroclor-1260	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants



Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
EPA - U.S. Environmental Protection Agency
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.



Legend
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River

Sample Locations by Matrix
- Sediment
- Soil

Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 500 1,000
Feet

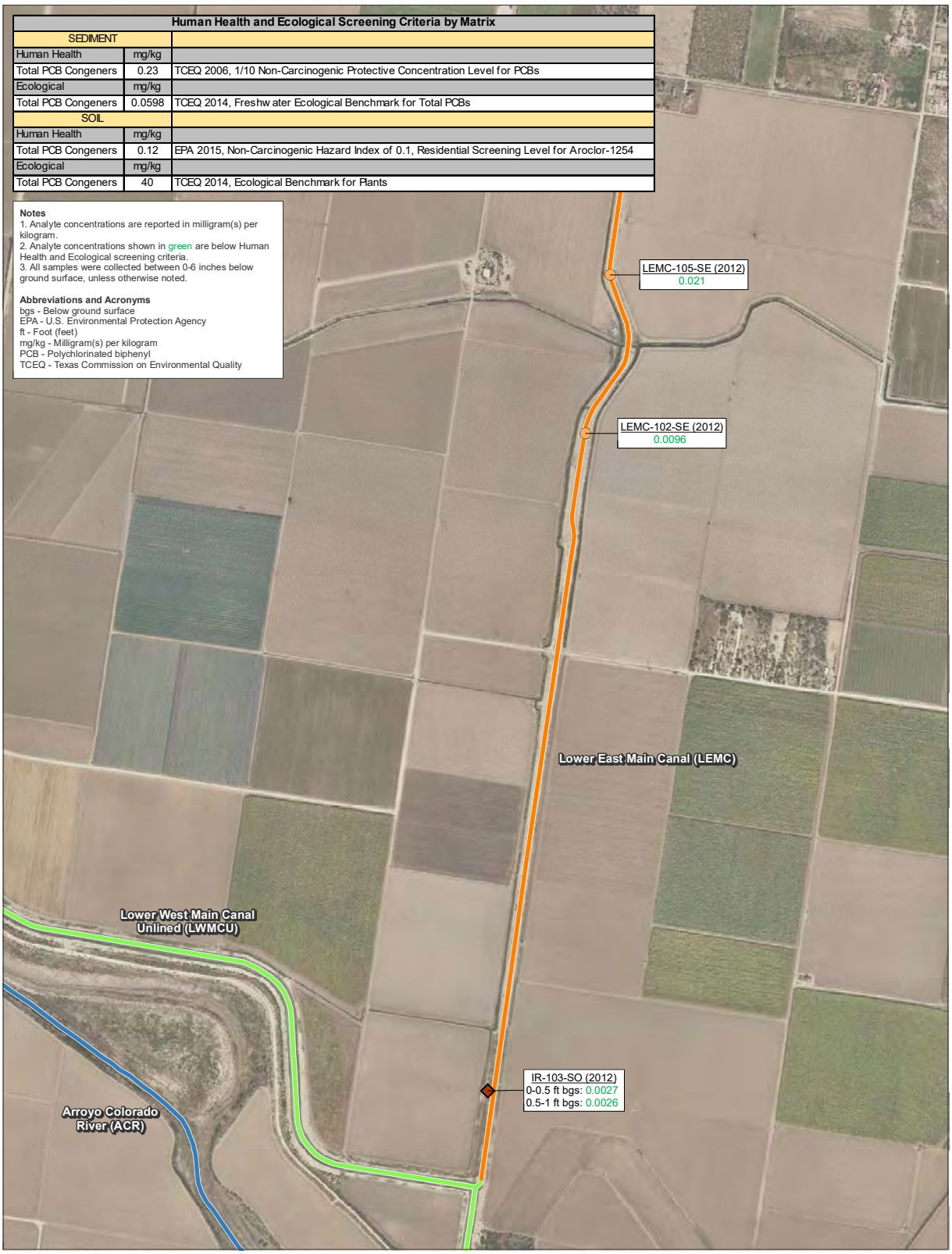
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

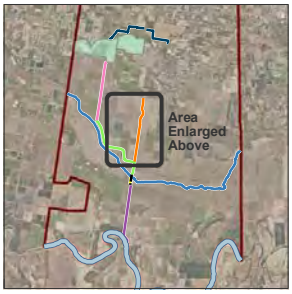
Figure 12
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment and Soil in the Lower East Main Canal

Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Total PCB Congeners	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Total PCB Congeners	0.0598	TCEQ 2014, Freshwater Ecological Benchmark for Total PCBs
SOIL		
Human Health	mg/kg	
Total PCB Congeners	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level for Aroclor-1254
Ecological	mg/kg	
Total PCB Congeners	40	TCEQ 2014, Ecological Benchmark for Plants

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
bgs - Below ground surface
EPA - U.S. Environmental Protection Agency
ft - Foot (feet)
mg/kg - Milligram(s) per kilogram
PCB - Polychlorinated biphenyl
TCEQ - Texas Commission on Environmental Quality





Legend
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River

Sample Locations by Matrix
- Sediment
- Soil

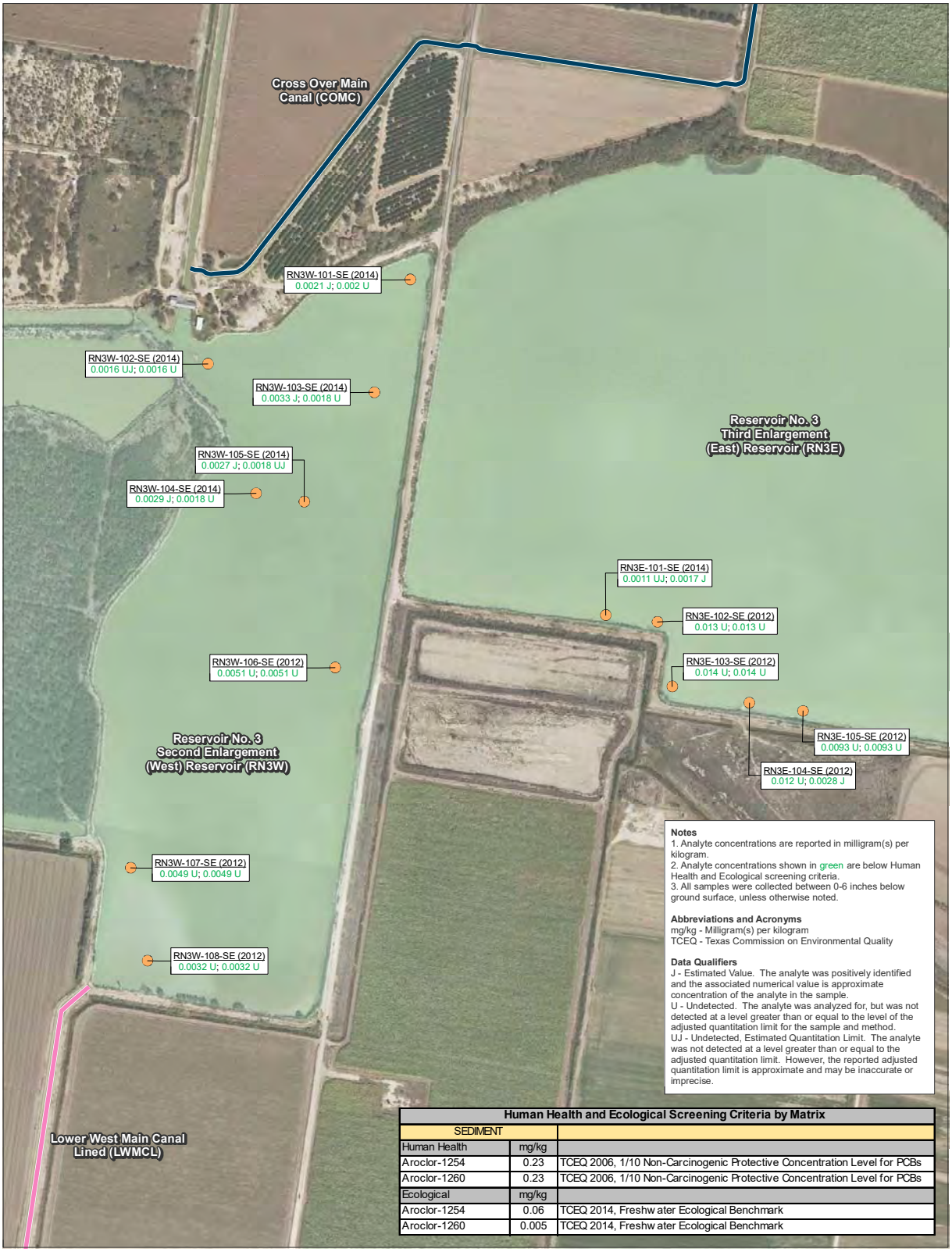
Sample Identification
Sample Depth (if multiple depths): Total PCB Congener Results

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 500 1,000
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 13
Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment and Soil in the Lower East Main Canal



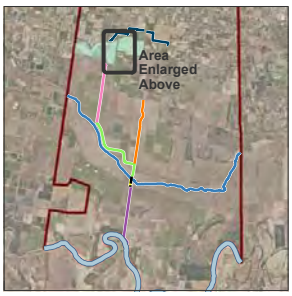
Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.

Human Health and Ecological Screening Criteria by Matrix

SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshw ater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshw ater Ecological Benchmark



Legend
- Cross Over Main Canal
- Lower West Main Canal Lined

Sample Locations by Matrix
- Sediment

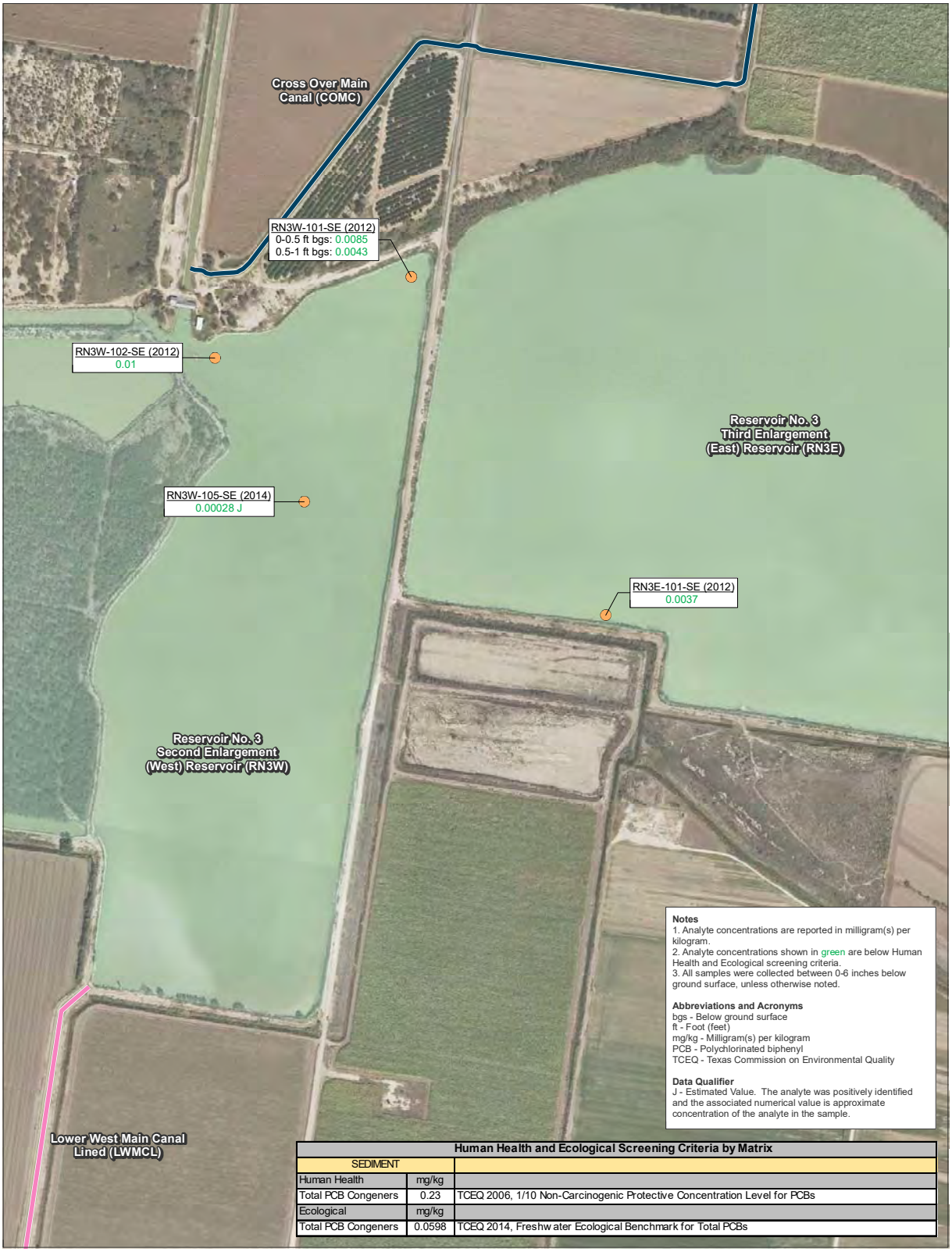
Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 400 800
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 14
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment in Reservoir No. 3

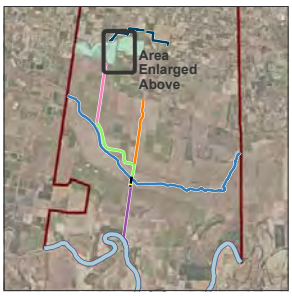


Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
bgs - Below ground surface
ft - Foot (feet)
mg/kg - Milligram(s) per kilogram
PCB - Polychlorinated biphenyl
TCEQ - Texas Commission on Environmental Quality

Data Qualifier
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.

Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Total PCB Congeners	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Total PCB Congeners	0.0598	TCEQ 2014, Freshwater Ecological Benchmark for Total PCBs



Legend
- Cross Over Main Canal
- Lower West Main Canal Lined

Sample Locations by Matrix
- Sediment

Sample Identification
Sample Depth (if multiple depths): Total PCB Congener Results

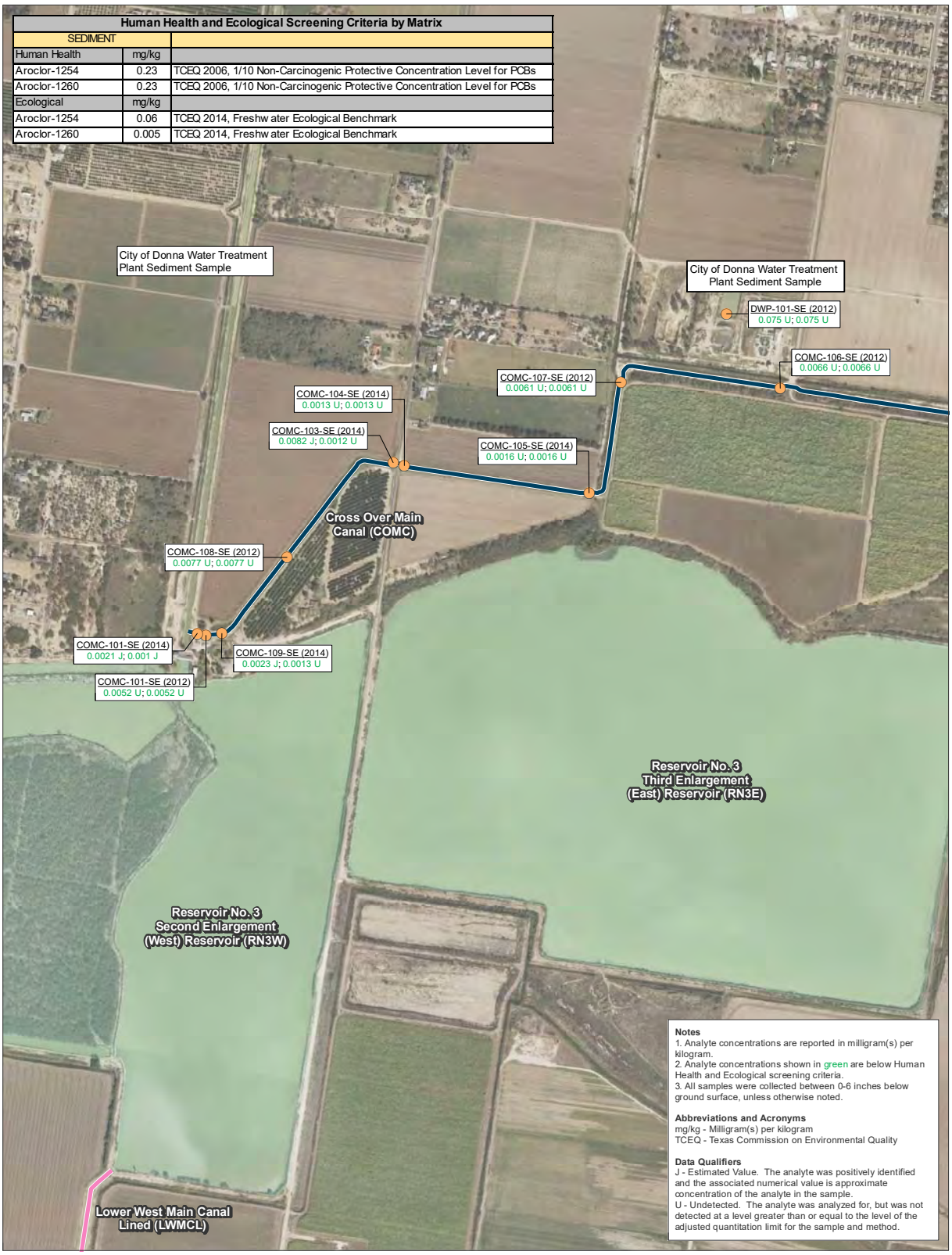
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

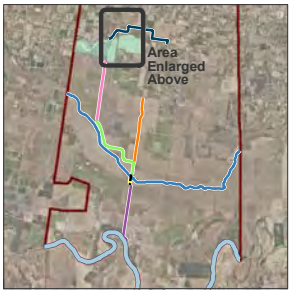
0 400 800
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 15
Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment in Reservoir No. 3

Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshw ater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshw ater Ecological Benchmark





Legend
- Cross Over Main Canal
- Lower West Main Canal Lined

Sample Locations by Matrix
- Sediment

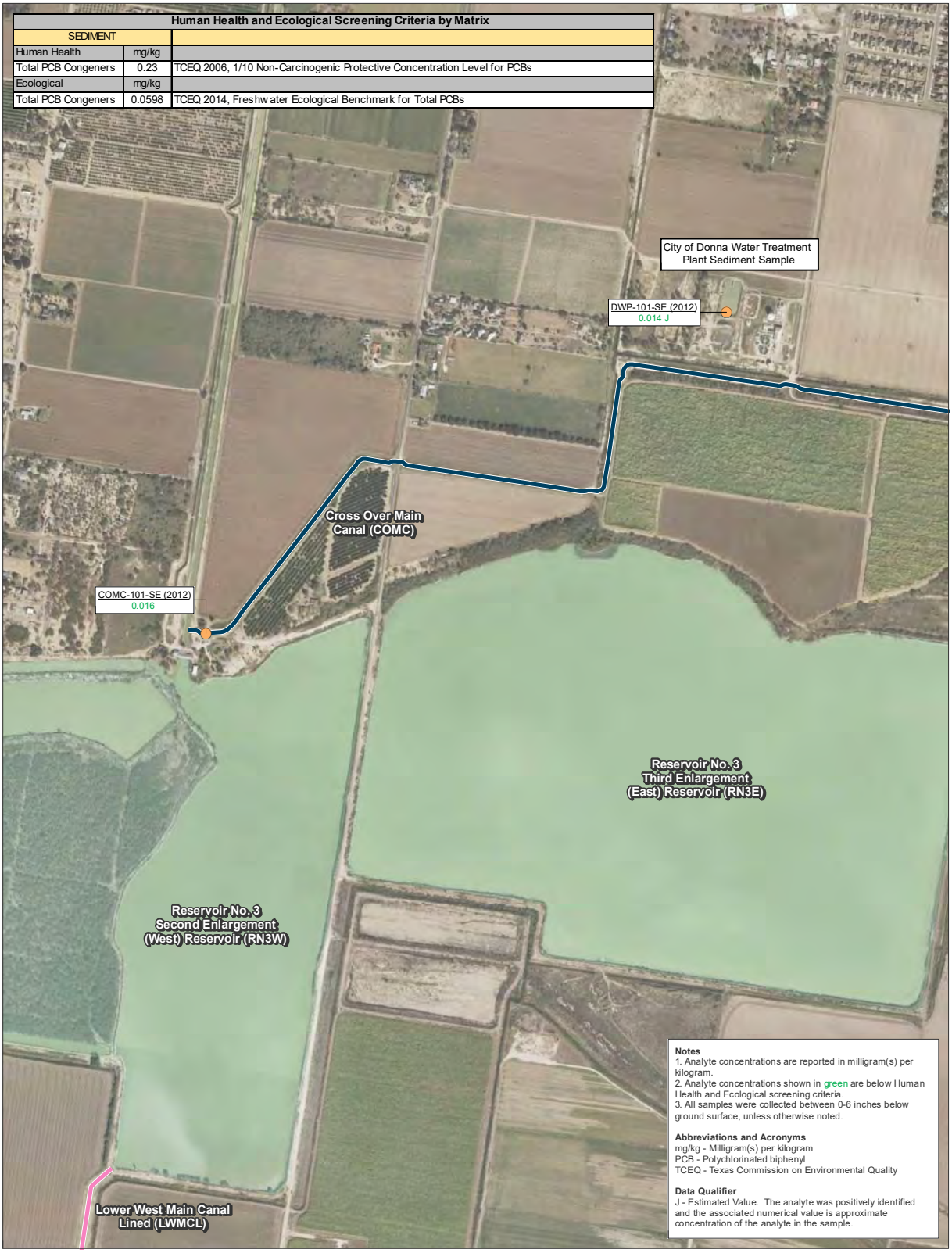
Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 400 800
Feet

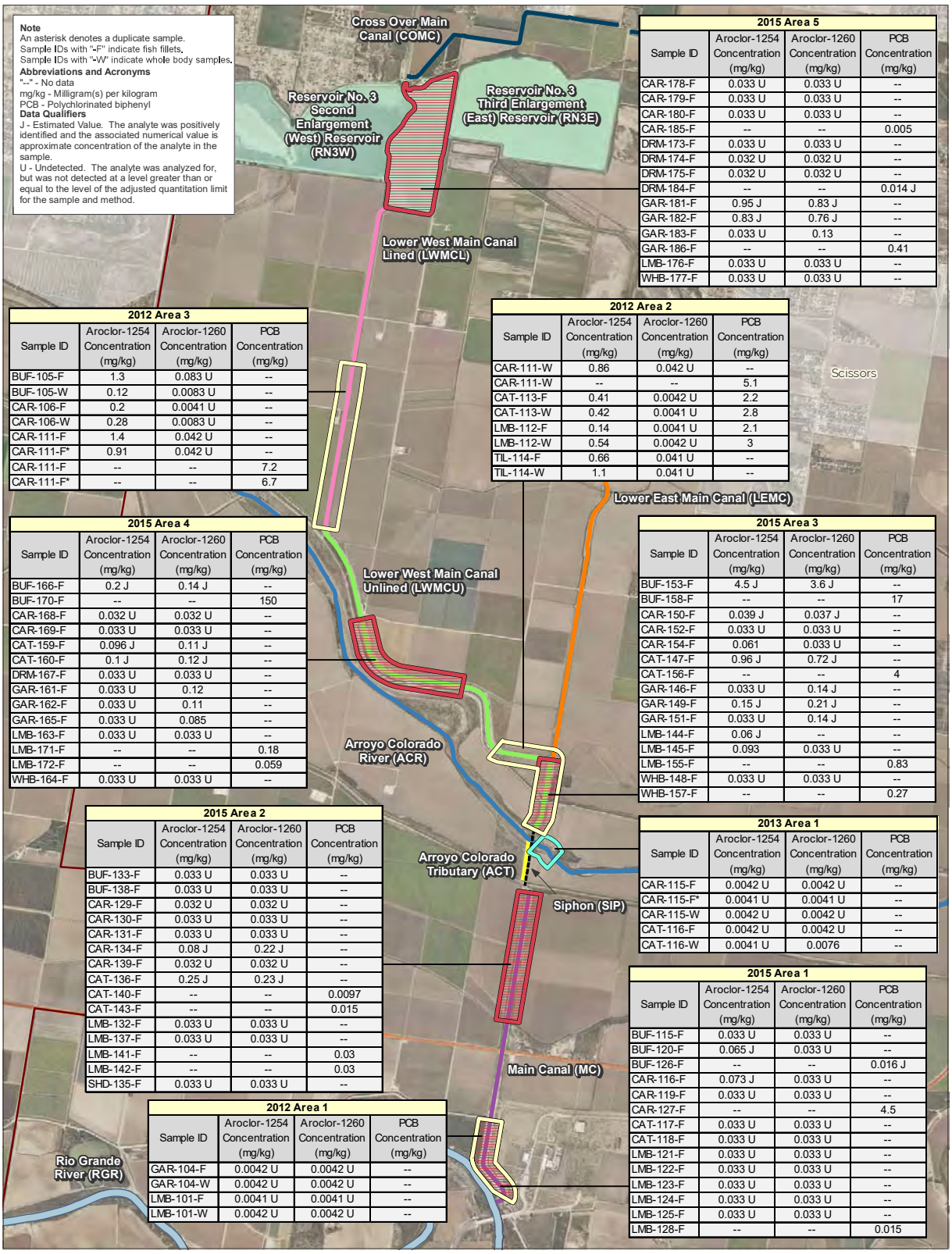
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 16
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment in the Cross Over Main Canal and Water Treatment Plant



Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 17
Concentrations of Total Polychlorinated Biphenyl Congeners in Sediment in the Cross Over Main Canal and Water Treatment Plant



2015 Area 5

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
CAR-178-F	0.033 U	0.033 U	--
CAR-179-F	0.033 U	0.033 U	--
CAR-180-F	0.033 U	0.033 U	--
CAR-185-F	--	--	0.005
DRM-173-F	0.033 U	0.033 U	--
DRM-174-F	0.032 U	0.032 U	--
DRM-175-F	0.032 U	0.032 U	--
DRM-184-F	--	--	0.014 J
GAR-181-F	0.95 J	0.83 J	--
GAR-182-F	0.83 J	0.76 J	--
GAR-183-F	0.033 U	0.13	--
GAR-186-F	--	--	0.41
LMB-176-F	0.033 U	0.033 U	--
WHB-177-F	0.033 U	0.033 U	--

2012 Area 3

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-105-F	1.3	0.083 U	--
BUF-105-W	0.12	0.0083 U	--
CAR-106-F	0.2	0.0041 U	--
CAR-106-W	0.28	0.0083 U	--
CAR-111-F	1.4	0.042 U	--
CAR-111-F*	0.91	0.042 U	--
CAR-111-F	--	--	7.2
CAR-111-F*	--	--	6.7

2012 Area 2

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
CAR-111-W	0.86	0.042 U	--
CAR-111-W	--	--	5.1
CAT-113-F	0.41	0.0042 U	2.2
CAT-113-W	0.42	0.0041 U	2.8
LMB-112-F	0.14	0.0041 U	2.1
LMB-112-W	0.54	0.0042 U	3
TIL-114-F	0.66	0.041 U	--
TIL-114-W	1.1	0.041 U	--

2015 Area 4

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-166-F	0.2 J	0.14 J	--
BUF-170-F	--	--	150
CAR-168-F	0.032 U	0.032 U	--
CAR-169-F	0.033 U	0.033 U	--
CAT-159-F	0.096 J	0.11 J	--
CAT-160-F	0.1 J	0.12 J	--
DRM-167-F	0.033 U	0.033 U	--
GAR-161-F	0.033 U	0.12	--
GAR-162-F	0.033 U	0.11	--
GAR-165-F	0.033 U	0.085	--
LMB-163-F	0.033 U	0.033 U	--
LMB-171-F	--	--	0.18
LMB-172-F	--	--	0.059
WHB-164-F	0.033 U	0.033 U	--

2015 Area 3

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-153-F	4.5 J	3.6 J	--
BUF-158-F	--	--	17
CAR-150-F	0.039 J	0.037 J	--
CAR-152-F	0.033 U	0.033 U	--
CAR-154-F	0.061	0.033 U	--
CAT-147-F	0.96 J	0.72 J	--
CAT-156-F	--	--	4
GAR-146-F	0.033 U	0.14 J	--
GAR-149-F	0.15 J	0.21 J	--
GAR-151-F	0.033 U	0.14 J	--
LMB-144-F	0.06 J	--	--
LMB-145-F	0.093	0.033 U	--
LMB-155-F	--	--	0.83
WHB-148-F	0.033 U	0.033 U	--
WHB-157-F	--	--	0.27

2015 Area 2

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-133-F	0.033 U	0.033 U	--
BUF-138-F	0.033 U	0.033 U	--
CAR-129-F	0.032 U	0.032 U	--
CAR-130-F	0.033 U	0.033 U	--
CAR-131-F	0.033 U	0.033 U	--
CAR-134-F	0.08 J	0.22 J	--
CAR-139-F	0.032 U	0.032 U	--
CAT-136-F	0.25 J	0.23 J	--
CAT-140-F	--	--	0.0097
CAT-143-F	--	--	0.015
LMB-132-F	0.033 U	0.033 U	--
LMB-137-F	0.033 U	0.033 U	--
LMB-141-F	--	--	0.03
LMB-142-F	--	--	0.03
SHD-135-F	0.033 U	0.033 U	--

2013 Area 1

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
CAR-115-F	0.0042 U	0.0042 U	--
CAR-115-F*	0.0041 U	0.0041 U	--
CAR-115-W	0.0042 U	0.0042 U	--
CAT-116-F	0.0042 U	0.0042 U	--
CAT-116-W	0.0041 U	0.0076	--

2015 Area 1

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-115-F	0.033 U	0.033 U	--
BUF-120-F	0.065 J	0.033 U	--
BUF-126-F	--	--	0.016 J
CAR-116-F	0.073 J	0.033 U	--
CAR-119-F	0.033 U	0.033 U	--
CAR-127-F	--	--	4.5
CAT-117-F	0.033 U	0.033 U	--
CAT-118-F	0.033 U	0.033 U	--
LMB-121-F	0.033 U	0.033 U	--
LMB-122-F	0.033 U	0.033 U	--
LMB-123-F	0.033 U	0.033 U	--
LMB-124-F	0.033 U	0.033 U	--
LMB-125-F	0.033 U	0.033 U	--
LMB-128-F	--	--	0.015

2012 Area 1

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
GAR-104-F	0.0042 U	0.0042 U	--
GAR-104-W	0.0042 U	0.0042 U	--
LMB-101-F	0.0041 U	0.0041 U	--
LMB-101-W	0.0042 U	0.0042 U	--

Legend

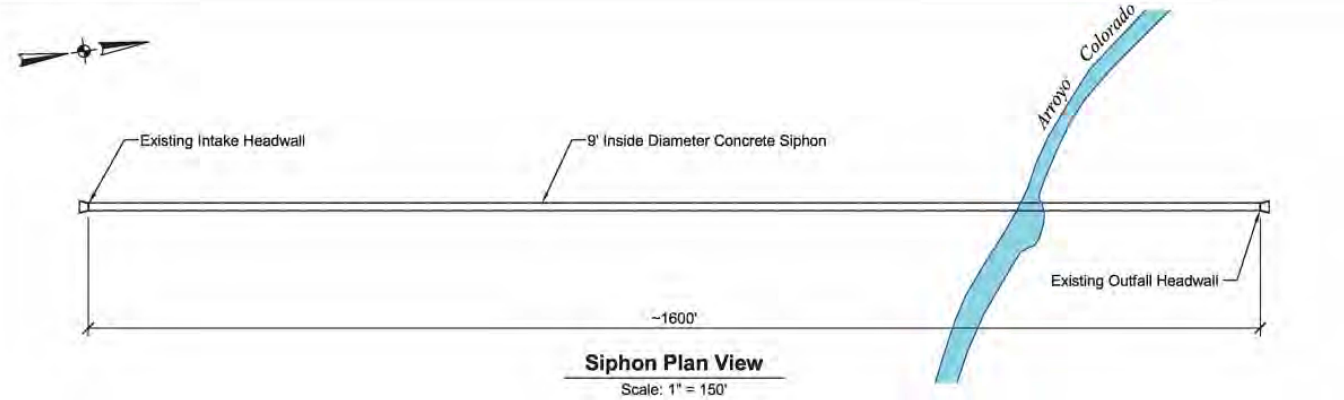
- Cross Over Main Canal
- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)
- Main Canal
- Rio Grande River
- Donna Reservoir
- Donna Irrigation District - Hidalgo County No. 1
- 2012 Fish Sample Area
- 2013 Fish Sample Area
- 2015 Fish Sample Area

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

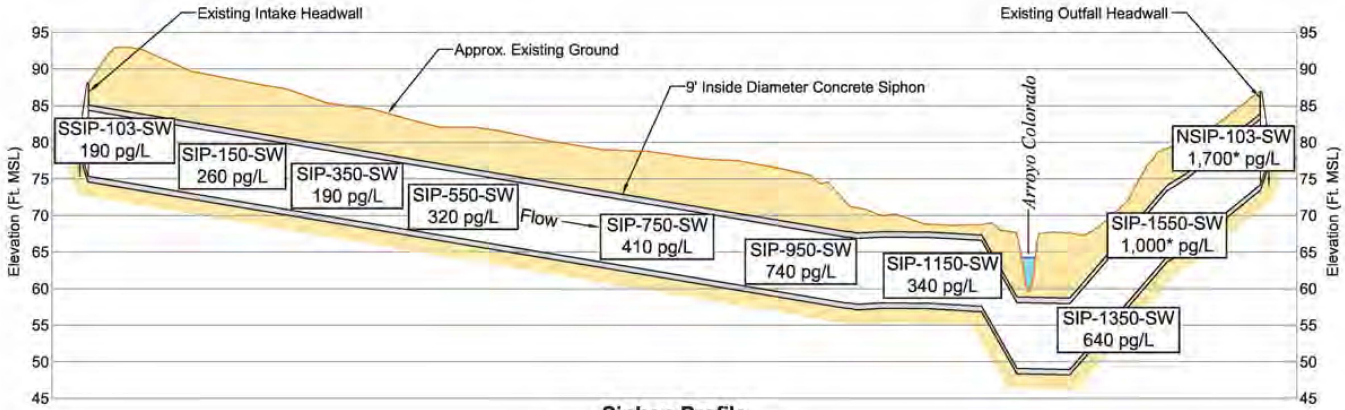
0 2,000 4,000
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 18
Fish Concentrations of Aroclor-1254, Aroclor-1260, and Total Polychlorinated Biphenyl Congeners



Siphon Plan View
Scale: 1" = 150'



Siphon Profile
Scale: 1" = 150' Horiz.; 1" = 15' Vert.
(10X Vertical Exaggeration)

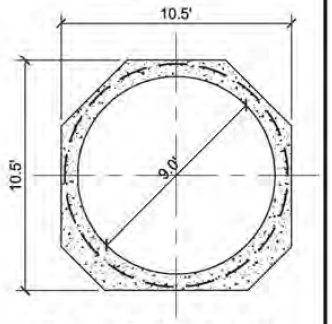
Siphon Profile
Scale: 1" = 150' Vert. & Horiz.
(No Vertical Exaggeration)

Note:

pg/L - picograms per liter

Sample locations should be considered approximate.

Flow measured at the Rio Grande Pumping Station was 40 cubic feet per second (cfs) during sampling, with the exception of samples marked with an asterisk (*). Asterisk marked results indicate the sample was collected during a flow of 100 cfs.



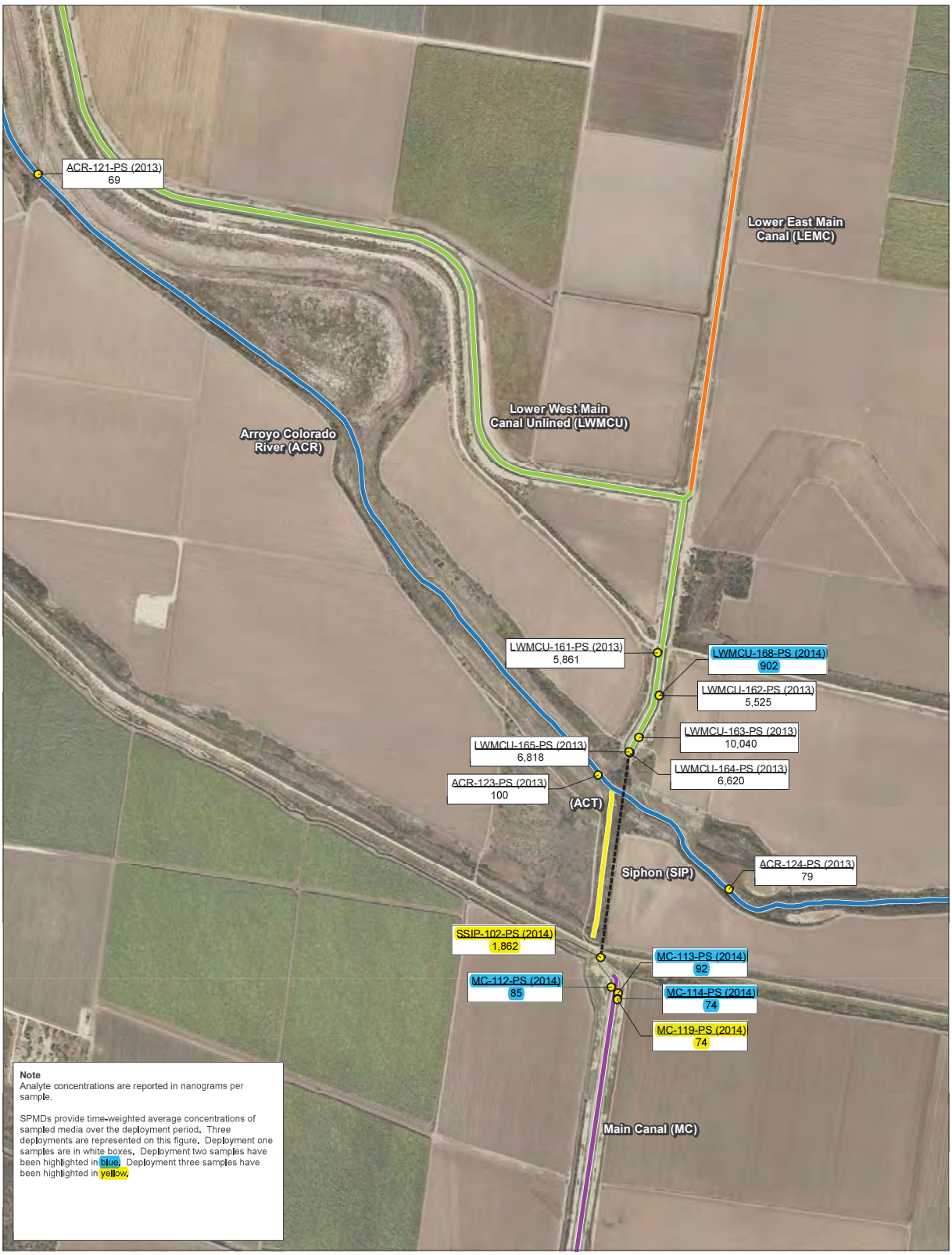
Typical Siphon Section
Scale: 1" = 5'

Note:
This figure has been adopted from:
URS Corporation. 2006. *Feasibility Study Report, Donna Reservoir and Canal System, Donna Hidalgo County, Texas.* Prepared for the Texas Commission on Environmental Quality. June.

The siphon plan, profile, and sections shown on this drawing are based on historic siphon drawings from the report *Inverted Siphon Inspection by Remotely Operated Vehicle* (ASI Marine, 2001), and from construction plans entitled *Rehabilitation of Irrigation Facilities - First Lift Main Canal* prepared by Sigler, Clark & Associates, Weslaco, Texas and dated July 1961. The accuracy of the historic siphon drawings has not been verified and all information is approximate and should not be used for design purposes.

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 19
Total Polychlorinated Biphenyl Congeners in Surface Water Samples Collected from Inside the Siphon

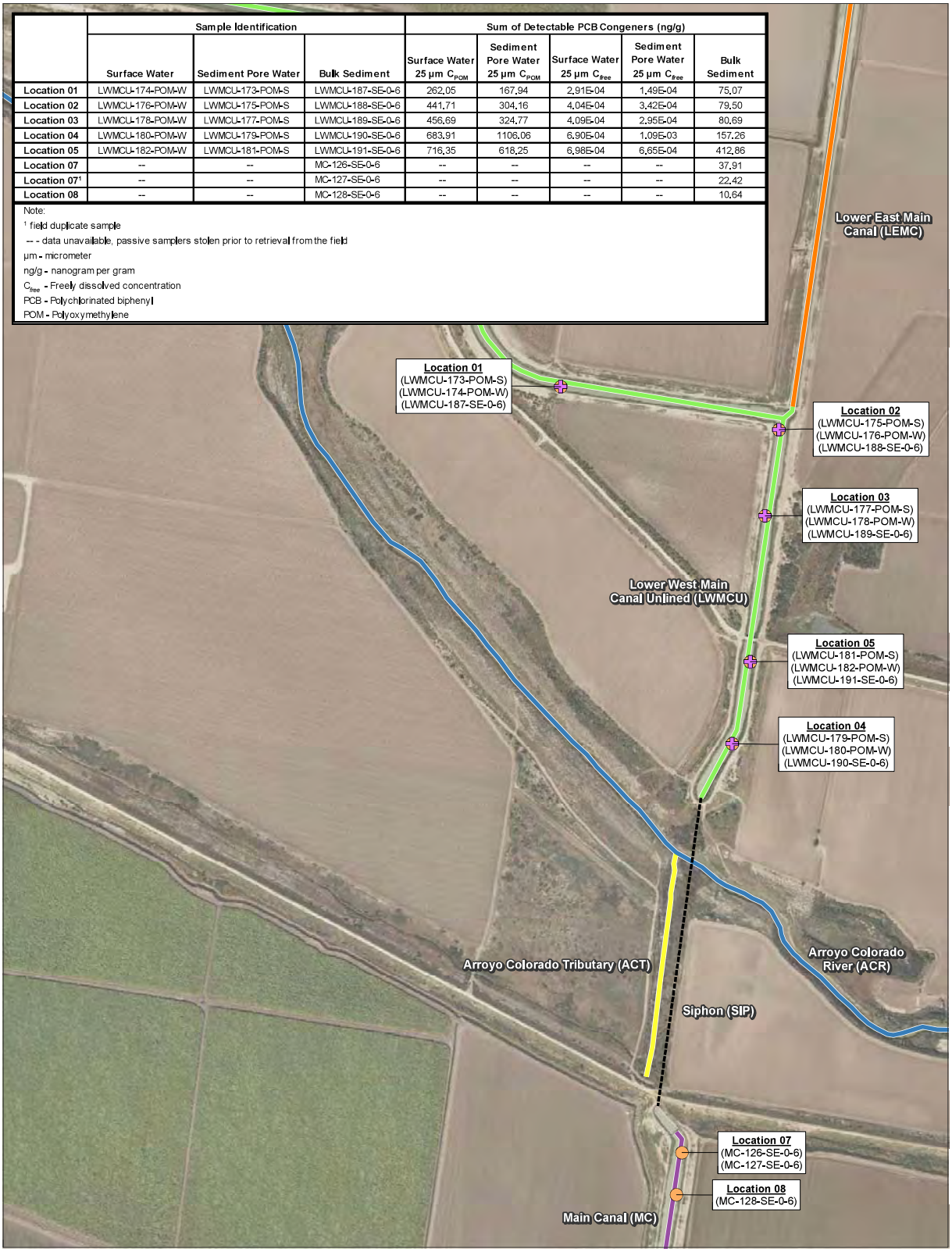


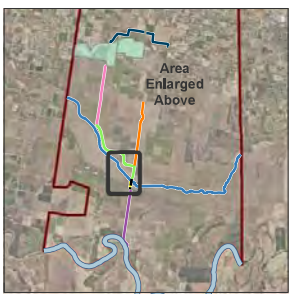
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 20
Semi-Permeable Membrane Device Concentrations of Total Polychlorinated Biphenyl Congeners

	Sample Identification			Sum of Detectable PCB Congeners (ng/g)				
	Surface Water	Sediment Pore Water	Bulk Sediment	Surface Water 25 µm C_{POM}	Sediment Pore Water 25 µm C_{POM}	Surface Water 25 µm C_{free}	Sediment Pore Water 25 µm C_{free}	Bulk Sediment
Location 01	LWMCU-174-POM-W	LWMCU-173-POM-S	LWMCU-187-SE-0-6	262.05	167.94	2.91E-04	1.49E-04	75.07
Location 02	LWMCU-176-POM-W	LWMCU-175-POM-S	LWMCU-188-SE-0-6	441.71	304.16	4.04E-04	3.42E-04	79.50
Location 03	LWMCU-178-POM-W	LWMCU-177-POM-S	LWMCU-189-SE-0-6	456.69	324.77	4.09E-04	2.95E-04	80.69
Location 04	LWMCU-180-POM-W	LWMCU-179-POM-S	LWMCU-190-SE-0-6	683.91	1106.06	6.90E-04	1.09E-03	157.26
Location 05	LWMCU-182-POM-W	LWMCU-181-POM-S	LWMCU-191-SE-0-6	716.35	618.25	6.98E-04	6.65E-04	412.86
Location 07	--	--	MC-126-SE-0-6	--	--	--	--	37.91
Location 07[1]	--	--	MC-127-SE-0-6	--	--	--	--	22.42
Location 08	--	--	MC-128-SE-0-6	--	--	--	--	10.64

Note:
[1] field duplicate sample
-- - data unavailable, passive samplers stolen prior to retrieval from the field
µm - micrometer
ng/g - nanogram per gram
C_{free} - Freely dissolved concentration
PCB - Polychlorinated biphenyl
POM - Polyoxymethylene





Legend
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)
- Main Canal

Sample Locations by Matrix
- Polyoxymethylene
- Sediment

Location (Sample Identification)

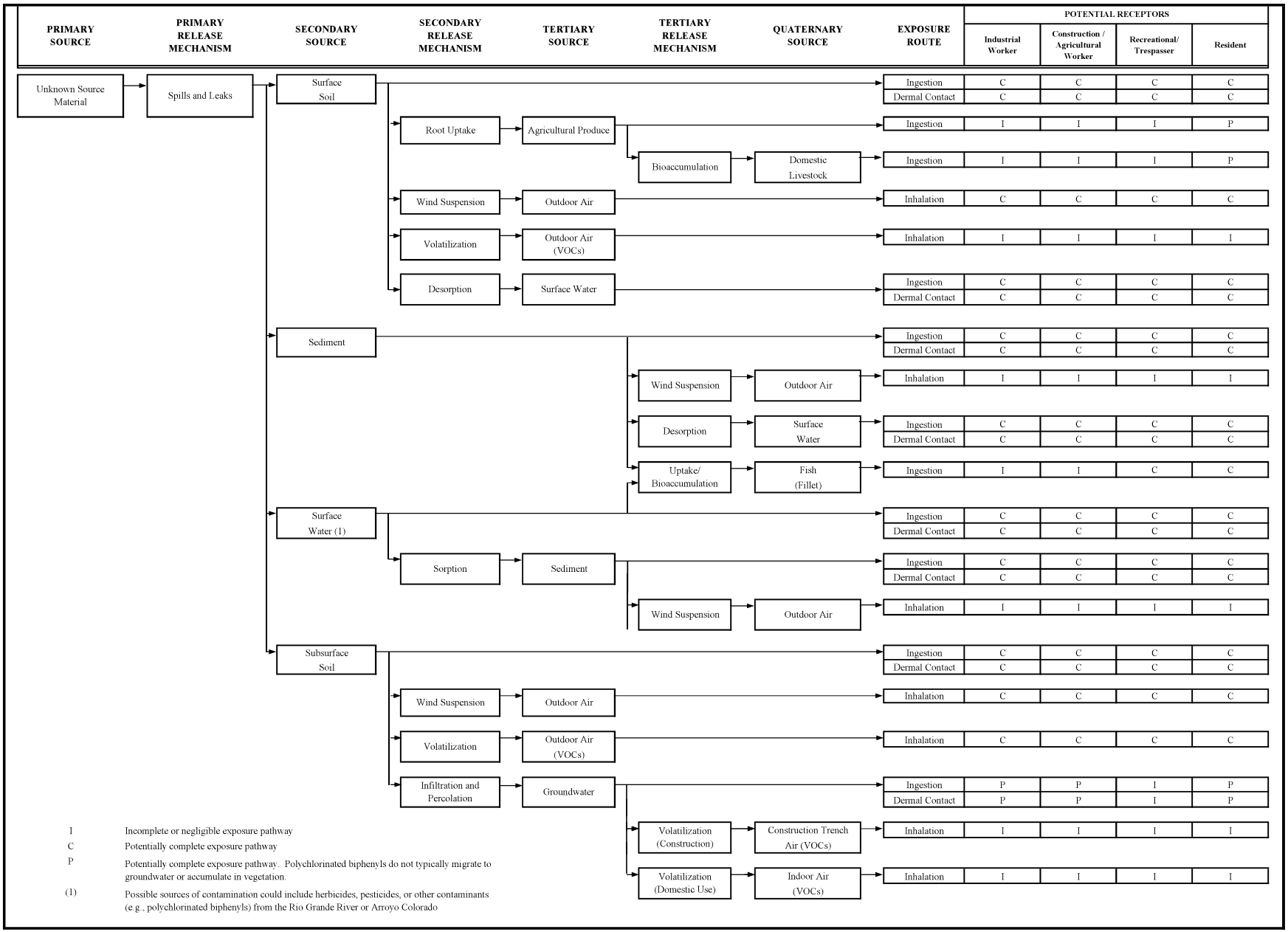
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

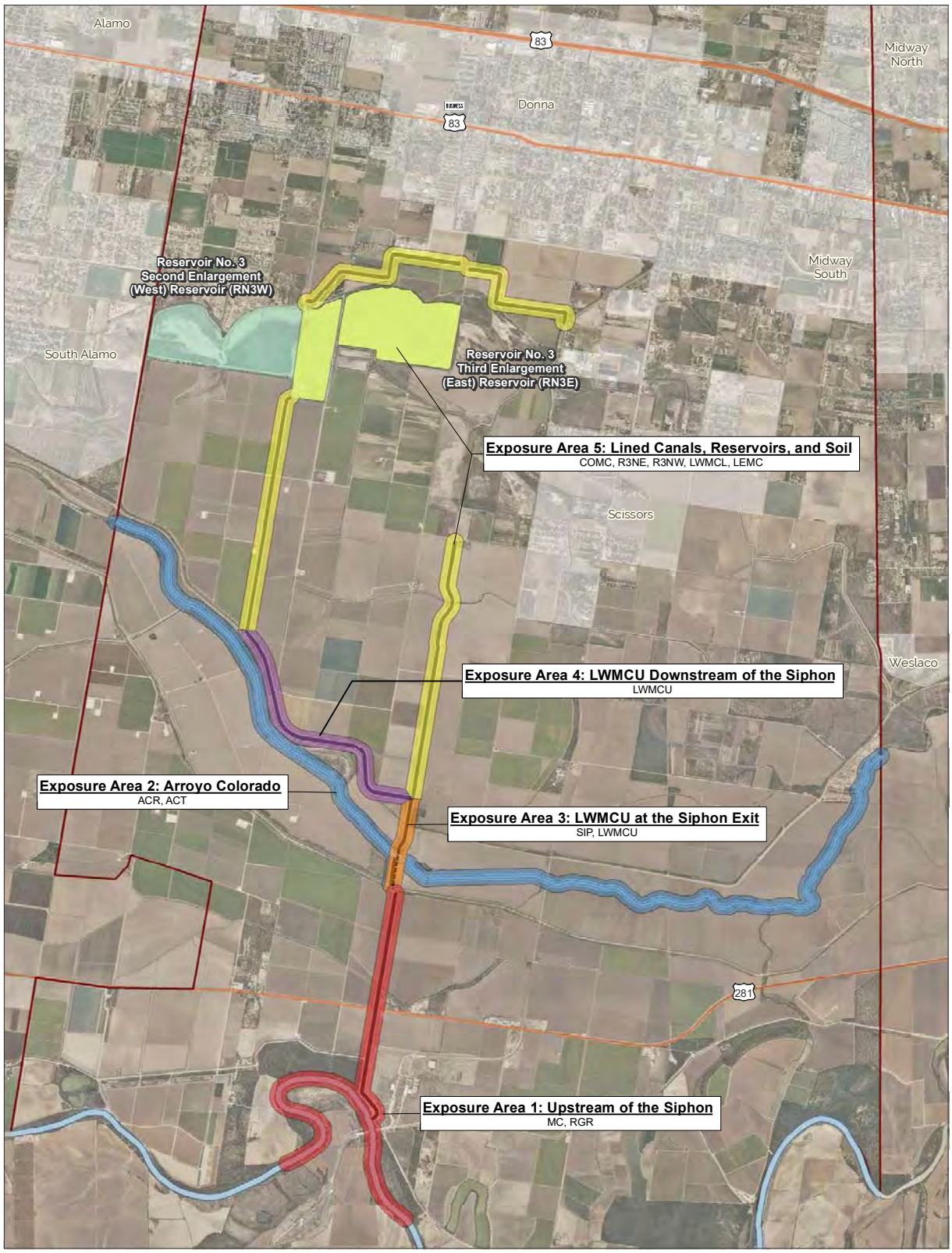
0 400 800
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 21
Polyoxymethylene Concentrations of Total Polychlorinated Biphenyl Congeners

FIGURE 22 HUMAN HEALTH CONCEPTUAL SITE MODEL, DONNA RESERVOIR AND CANAL SYSTEM





Legend

- Donna Irrigation District - Hidalgo County No. 1
- Donna Reservoir
- Exposure Area 1: Upstream of the Siphon
- Exposure Area 2: Arroyo Colorado
- Exposure Area 3: LWMCU at the Siphon Exit
- Exposure Area 4: LWMCU Downstream of the Siphon
- Exposure Area 5: Lined Canals, Reservoirs, and Soil

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 2,000 4,000
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 23
Ecological Exposure Areas

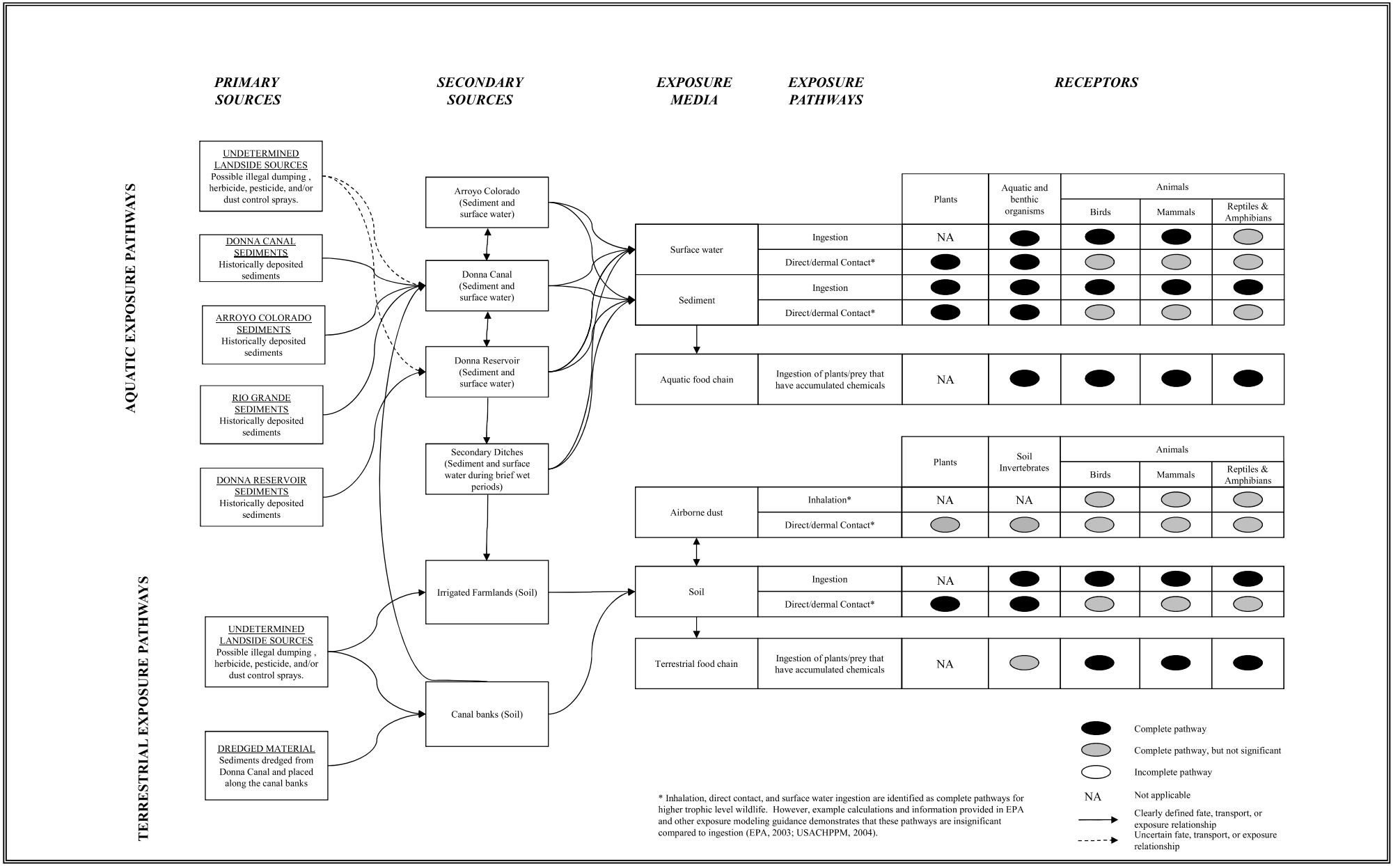
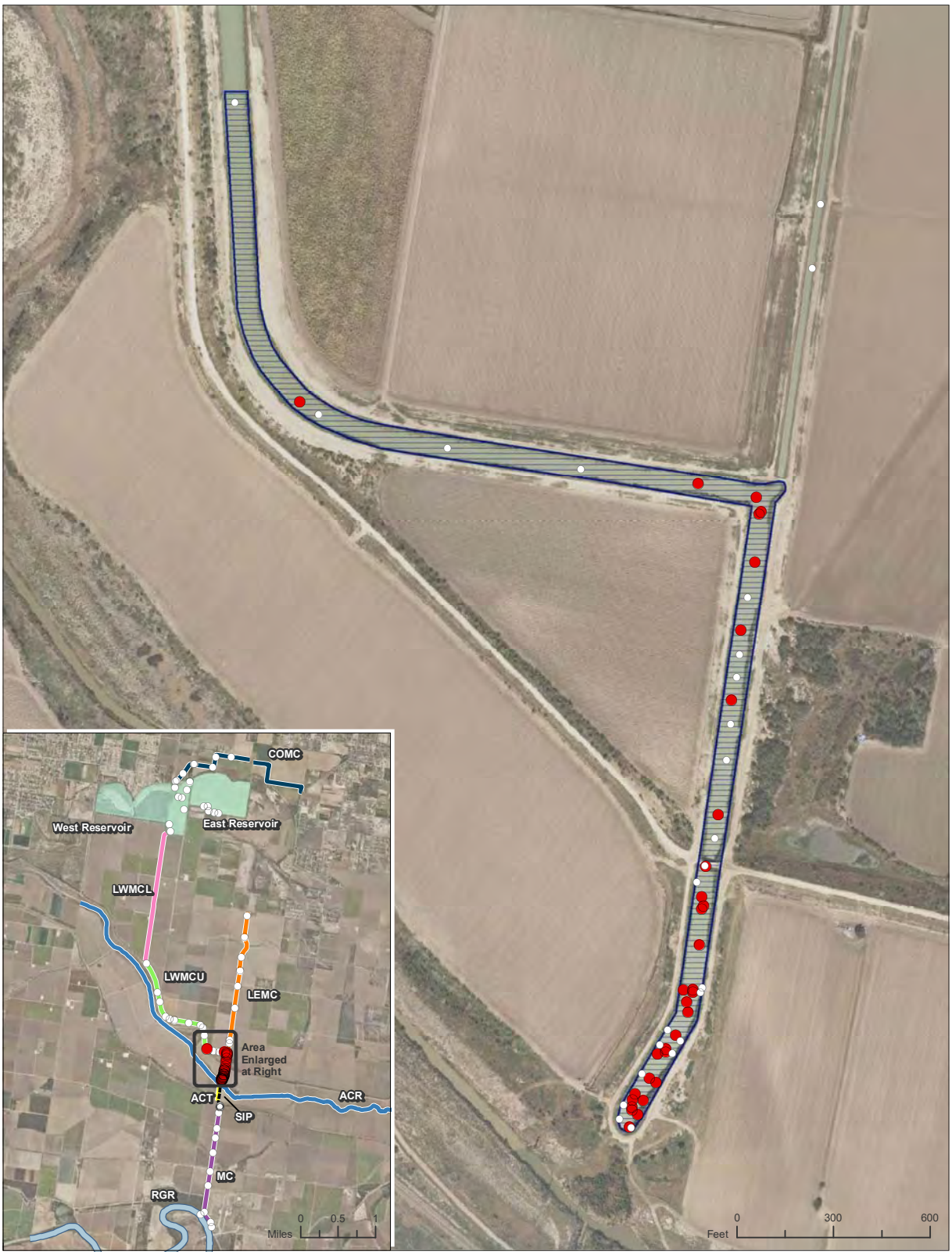
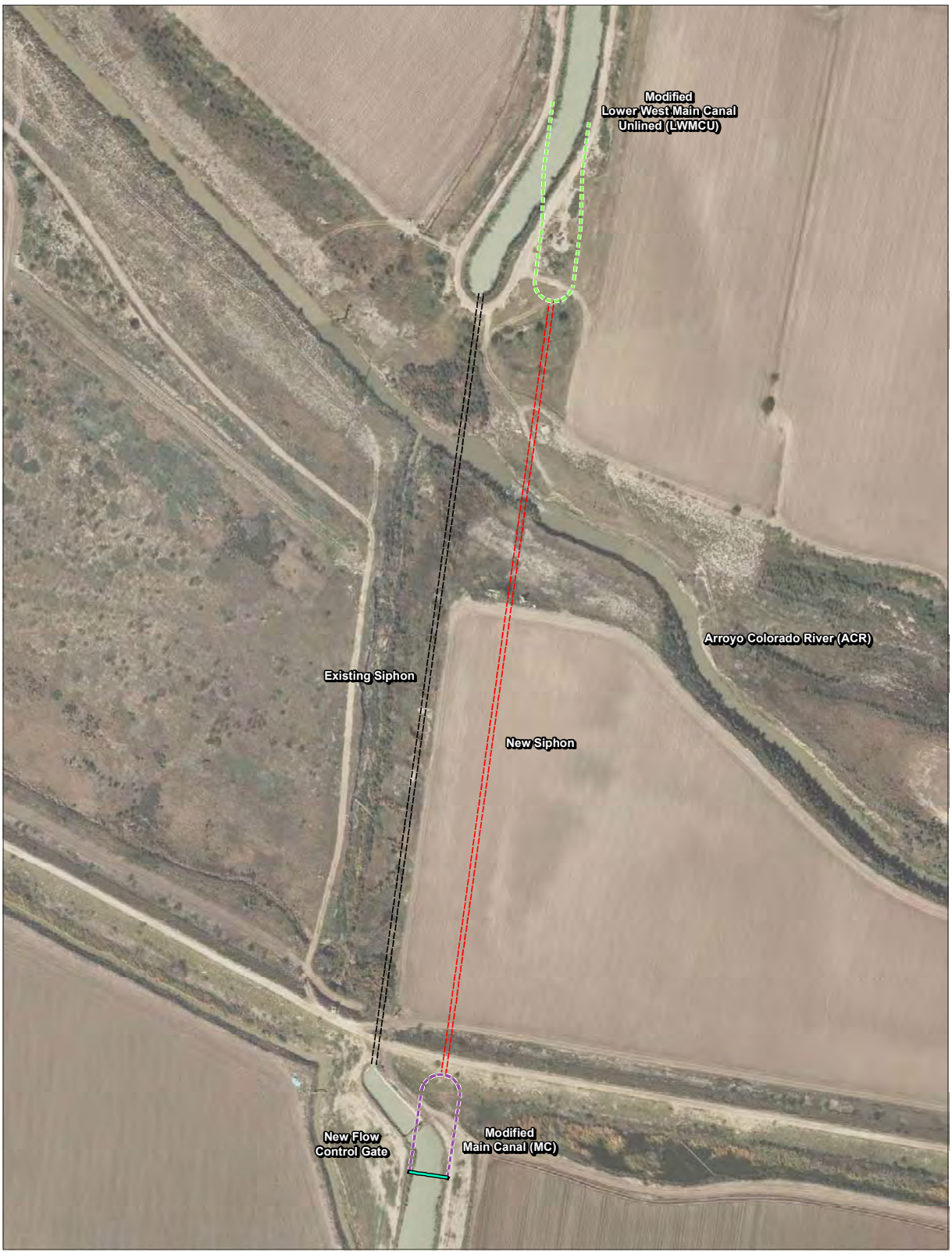


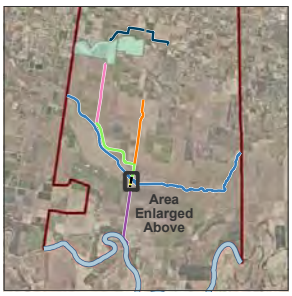
FIGURE 24 ECOLOGICAL CONCEPTUAL SITE MODEL, DONNA RESERVOIR AND CANAL SYSTEM



Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 25
Sediment Remediation Area Based on a Sediment Cleanup Goal of 0.043 mg/kg





Legend

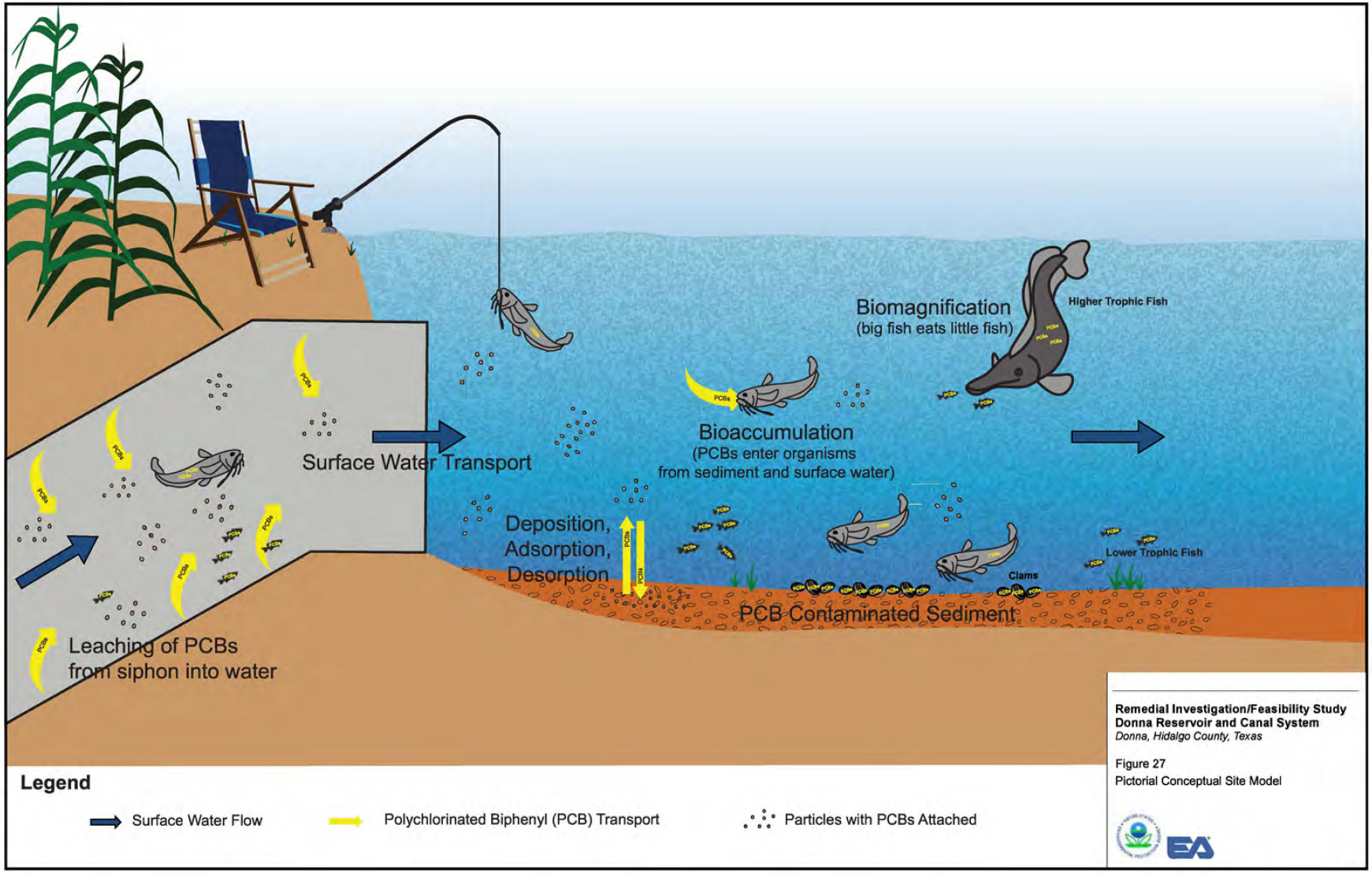
- Lower West Main Canal Unlined (Modified)
- Main Canal (Modified)
- New Flow Control Gate
- New Siphon
- Existing Siphon

Data Sources: Esri 2006,
Texas A&M AgriLife Extension Service 2015, USGS 2014

0 100 200
Feet

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 26
Siphon Replacement


Biomagnification
(big fish eats little fish)
Higher Trophic Fish
Bioaccumulation
(PCBs enter organisms
from sediment and surface water)
Surface Water Transport
Deposition,
Adsorption,
Desorption
Lower Trophic Fish
Clams
PCB Contaminated Sediment
Leaching of PCBs
from siphon into water
Legend
Surface Water Flow
Polychlorinated Biphenyl (PCB) Transport
Particles with PCBs Attached
Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas
Figure 27
Pictorial Conceptual Site Model

Appendix A

Summary of Human Health Exposure Factors and Intake Equations

VALUES USED FOR RESIDENT ADULT DAILY SOIL INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil, Air
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation / Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	Chronic Daily Intake (CDI) (mg/kg/day) =
	CR	Ingestion Rate	mg/day	100	U.S. EPA 2011	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	20	U.S. EPA 2011	
	ED-C	Exposure Duration-Cancer	yr	20	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	Mutagenic Chronic Daily Intake (MCDI) (mg/kg/day) =
	AT-NC	Averaging time - Noncancer	days	7,300	U.S. EPA 1989	CS x EF x ([(ED$_{6-16}$ x CR x 3) + (ED$_{16-30}$ x CR x 1)]/BW) x CF / (AT)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	6,032	U.S. EPA 2015a	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.07	U.S. EPA 2004 (1)	
	EF	Exposure Frequency	event/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	20	U.S. EPA 2011	
	ED-C	Exposure Duration - Cancer	yr	20	U.S. EPA 2011	Mutagenic Chronic Daily Intake (MCDI) (mg/kg/day) =
	BW	Body Weight	kg	80	U.S. EPA 2011	CS x EF x ABS x ([(ED$_{6-16}$ x SA x AF x 3) + (ED$_{16-30}$ x SA x AF x 1)]/BW) x CF / (AT)
	AT-NC	Averaging time - Noncancer	days	7,300	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
	ABS	Dermal Absorption Fraction	unitless	Chemical-Specific	U.S. EPA 2004 (2)	
Inhalation	CA	Chemical Concentration in Air	mg/m^3	Chemical-Specific	Chemical-Specific	Exposure Concentration (µg/m^3 or mg/m^3) =
	CF$_1$	Conversion Factor	µg/mg	1,000	U.S. EPA 2009a	CA x CF$_1$ x ET x EF x ED / AT x CF$_2$
	ET	Exposure Time	hr/day	24	U.S. EPA 2009a	Note: CF$_1$ only used in carcinogenic intake calculations
	EF	Exposure Frequency	day/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	20	U.S. EPA 2011	
	ED-C	Exposure Duration - Cancer	yr	20	U.S. EPA 2011	Mutagenic Exposure Concentration (MEC) (µg/m^3) =
	AT-NC	Averaging time - Noncancer	days	7,300	U.S. EPA 1989	CA x ET x EF x [(ED$_{6-16}$ x 3) + (ED$_{16-30}$ x 1)] x CF$_1$ / (AT x CF$_2$)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF$_2$	Conversion Factor	hr/day	24	U.S. EPA 2009a	

(1) Taken from Exhibit 3-5 of USEPA 2004.
(2) Taken from Exhibit 3-4 of USEPA 2004.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
kg/mg = kilograms per milligram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
mg/m^3 = milligram per cubic meter
µg/m^3 = micrograms per cubic meter
cm^2 /event = square centimeters per event
µg/mg = microgram per milligram
kg = kilogram
hr/day = hours per day

VALUES USED FOR RESIDENT CHILD DAILY SOIL INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil, Air
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation / Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	Chronic Daily Intake (CDI) (mg/kg/day) =
	CR	Ingestion Rate	mg/day	200	U.S. EPA 2011	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	6	U.S. EPA 1991a	
	ED-C	Exposure Duration-Cancer	yr	6	U.S. EPA 1991a	
	BW	Body Weight	kg	15	U.S. EPA 1989	Mutagenic Chronic Daily Intake (MCDI) (mg/kg/day) =
	AT-NC	Averaging time - Noncancer	days	2,190	U.S. EPA 1989	CS x EF x ([(ED$_{0\text{-}2}$ x CR x 10) + (ED$_{2\text{-}6}$ x CR x 3)]/BW) x CF / (AT)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	2,373	U.S. EPA 2015a	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.2	U.S. EPA 2004 (1)	
	EF	Exposure Frequency	event/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	6	U.S. EPA 1991a	
	ED-C	Exposure Duration - Cancer	yr	6	U.S. EPA 1991a	
	BW	Body Weight	kg	15	U.S. EPA 1989	Mutagenic Chronic Daily Intake (MCDI) (mg/kg/day) =
	AT-NC	Averaging time - Noncancer	days	2,190	U.S. EPA 1989	CS x EF x ABS x ([(ED$_{0\text{-}2}$ x SA x AF x 10) + (ED$_{2\text{-}6}$ x SA x AF x 3)]/BW) x CF / (AT)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
	ABS	Dermal Absorption Fraction	unitless	Chemical-Specific	U.S. EPA 2004 (2)	
Inhalation	CA	Chemical Concentration in Air	mg/m^3	Chemical-Specific	Chemical-Specific	Exposure Concentration (µg/m^3 or mg/m^3) =
	CF$_1$	Conversion Factor	µg/mg	1,000	U.S. EPA 2009a	CA x CF$_1$ x ET x EF x ED / AT x CF$_2$
	ET	Exposure Time	hr/day	24	U.S. EPA 2009a	Note: CF$_1$ only used in carcinogenic intake calculations
	EF	Exposure Frequency	day/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	6	U.S. EPA 1991a	
	ED-C	Exposure Duration - Cancer	yr	6	U.S. EPA 1991a	
	BW	Body Weight	kg	15	U.S. EPA 1989	Mutagenic Exposure Concentration (MEC) (µg/m^3) =
	AT-NC	Averaging time - Noncancer	days	2,190	U.S. EPA 1989	CA x ET x EF x [(ED$_{0\text{-}2}$ x 10) + (ED$_{2\text{-}6}$ x 3)] x CF$_1$ / (AT x CF$_2$)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF$_2$	Conversion Factor	hr/day	24	U.S. EPA 2009a	

(1) Taken from Exhibit 3-5 of USEPA 2004.
(2) Taken from Exhibit 3-4 of USEPA 2004.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
kg/mg = kilograms per milligram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
mg/m^3 = milligram per cubic meter
µg/m^3 = micrograms per cubic meter
cm^2 /event = square centimeters per event
µg/mg = microgram per milligram
kg = kilogram
hr/day = hours per day

VALUES USED FOR AGRICULTURAL WORKER DAILY SOIL INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil, Air
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Agricultural Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation / Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	mg/day	100	U.S. EPA 2011	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	250	U.S. EPA 1991a	
	ED	Exposure Duration	yr	25	U.S. EPA 1991a	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	10,950	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	3,527	U.S. EPA 2015a	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.12	U.S. EPA 2004 (1)	
	EF	Exposure Frequency	event/yr	250	U.S. EPA 1991a	
	ED	Exposure Duration	yr	25	U.S. EPA 1991a	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	10,950	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
	ABS	Dermal Absorption Fraction	unitless	Chemical-Specific	U.S. EPA 2004 (2)	
Inhalation	CA	Chemical Concentration in Air	mg/m^3	Chemical-Specific	Chemical-Specific	Exposure Concentration ($\mu g/m^3$ or mg/m^3) =
	CF_1	Conversion Factor	µg/mg	1,000	U.S. EPA 2009a	CA x CF_1 x ET x EF x ED / AT x CF_2
	ET	Exposure Time	hr/day	8	U.S. EPA 2009a	Note: CF_1 only used in carcinogenic intake calculations
	EF	Exposure Frequency	day/yr	250	U.S. EPA 1991a	
	ED	Exposure Duration	yr	25	U.S. EPA 1991a	
	AT-NC	Averaging time - Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF_2	Conversion Factor	hr/day	24	U.S. EPA 2009a	

(1) Taken from Exhibit 3-5 of USEPA 2004.
(2) Taken from Exhibit 3-4 of USEPA 2004.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
kg/mg = kilograms per milligram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
mg/m^3 = milligram per cubic meter
$\mu g/m^3$ = micrograms per cubic meter
cm^2 /event = square centimeters per event
µg/mg = microgram per milligram
kg = kilogram
hr/day = hours per day

VALUES USED FOR ADULT RECREATIONAL USER
DAILY SURFACE WATER INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CW	Concentration in Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	L/day	0.043	U.S. EPA 2011 (1)	CW x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	26	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time-Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
Dermal	CW	Concentration in Surface Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2	6,032	U.S. EPA 2011 (3)	CW x SA x PC x ET x EF x ED x CF / (BW x AT)
	PC	Permeability Coefficient	cm/hr	Chemical-Specific	Chemical-Specific	
	ET	Exposure Time	hr/day	4	U.S. EPA 2011 (1)	For organic compounds
	EF	Exposure Frequency	day/yr	52	BPJ (2)	CDI (mg/kg/day) =
	ED	Exposure Duration	yr	26	U.S. EPA 2011	DA_{event} x SA x EF x ED / (BW x AT)
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	L/cm^3	0.001	U.S. EPA 1989	

(1) The incidental ingestion rate of surface water is taken from the USEPA *Exposure Factors Handbook* , Table 3-93. Ingestion of surface water is assumed during fishing activities, which has an ingestion rate of 10.8 mL/hr. Assuming an exposure time of 4 hour/day results in an ingestion rate of 43.2 mL/day.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Assumes contact with head, hands, forearms, lower legs, and feet.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/L = milligrams per liter
day/yr = days per year
yr = year
kg = kilogram
RME = Reasonable Maximum Exposure
hr/day = hours per day
cm^2 = square centimeters
cm/hr = centimeter per hour
L/cm^3 = liters per cubic centimeter

VALUES USED FOR ADOLESCENT RECREATIONAL USER
DAILY SURFACE WATER INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CW	Concentration in Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day)=
	CR	Ingestion Rate	L/day	0.043	U.S. EPA 2011 (1)	CW x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	10	BPJ (3)	
	BW	Body Weight	kg	45	U.S. EPA 2011	
	AT-NC	Averaging time-Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
Dermal	CW	Concentration in Surface Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2	3,800	U.S. EPA 2011 (4)	CW x SA x PC x ET x EF x ED x CF / (BW x AT)
	PC	Permeability Coefficient	cm/hr	Chemical-Specific	Chemical-Specific	
	ET	Exposure Time	hr/day	4	U.S. EPA 2011 (1)	For organic compounds
	EF	Exposure Frequency	day/yr	52	BPJ (2)	CDI (mg/kg/day) =
	ED	Exposure Duration	yr	10	BPJ (3)	DA_{event} x SA x EF x ED / (BW x AT)
	BW	Body Weight	kg	45	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	L/cm^3	0.001	U.S. EPA 1989	

(1) The incidental ingestion rate of surface water is taken from the USEPA *Exposure Factors Handbook* , Table 3-93. Ingestion of surface water is assumed during fishing activities, which has an ingestion rate of 10.8 mL/hr. Assuming an exposure time of 4 hour/day results in an ingestion rate of 43.2 mL/day.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Assumes age range of adolescent is 6 to 16 years of age.
(4) Skin surface area is taken from Table 7-17 and Table 7-9 of 2011 EFH. Table 7-17 notes 29% of exposed skin surface available for 5 to 17 year old during outdoor activities. Table 7-9 presents the total skin surface area for 6 to <11 years of age and 11 to <16 years of age for male and female combined.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/L = milligrams per liter
day/yr = days per year
yr = year
kg = kilogram
RME = Reasonable Maximum Exposure
hr/day = hours per day
cm^2 = square centimeters
cm/hr = centimeter per hour
L/cm^3 = liters per cubic centimeter

VALUES USED FOR CHILD RECREATIONAL USER
DAILY SURFACE WATER INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CW	Concentration in Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	L/day	0.043	U.S. EPA 2011 (1)	CW x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	4	BPJ (3)	
	BW	Body Weight	kg	18	U.S. EPA 1989	
	AT-NC	Averaging time-Noncancer	days	1,460	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
Dermal	CW	Concentration in Surface Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2	2,373	U.S. EPA 2004	CW x SA x PC x ET x EF x ED x CF / (BW x AT)
	PC	Permeability Coefficient	cm/hr	Chemical-Specific	Chemical-Specific	
	ET	Exposure Time	hr/day	4	U.S. EPA 2011 (1)	For organic compounds
	EF	Exposure Frequency	day/yr	52	BPJ (2)	CDI (mg/kg/day) =
	ED	Exposure Duration	yr	4	BPJ (3)	DA_{event} x SA x EF x ED / (BW x AT)
	BW	Body Weight	kg	15	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	1,095	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	L/cm^3	0.001	U.S. EPA 1989	

(1) The incidental ingestion rate of surface water is taken from the USEPA *Exposure Factors Handbook* , Table 3-93. Ingestion of surface water is assumed during fishing activities, which has an ingestion rate of 10.8 mL/hr. Assuming an exposure time of 4 hour/day results in an ingestion rate of 43.2 mL/day.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Age range for child is assumed from 2 to 6 years. It is expected that children younger then 2 years will not have contact with surface water.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/L = milligrams per liter
day/yr = days per year
yr = year
kg = kilogram
RME = Reasonable Maximum Exposure
hr/day = hours per day
cm^2 = square centimeters
cm/hr = centimeter per hour
L/cm^3 = liters per cubic centimeter

VALUES USED FOR ADULT RECREATIONAL USER
DAILY SEDIMENT INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Sediment	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	mg/day	50	BPJ (1)	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	26	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	4,782	U.S. EPA 2011 (3)	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.07	U.S. EPA 2004 (4)	
	ABS	Dermal Absorption Fraction	Unitless	Chemical-Specific	U.S. EPA 2004	
	EF	Exposure Frequency	event/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	26	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	

(1) The incidental sediment ingestion rate is assumed to be equal to the soil ingestion rate presented in Table 5-1 of USEPA *Exposure Factors Handbook* and does not take into account dust ingestion.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Contact with sediment will be with the hands, forearms, feet and lower legs.
(4) The adherence factor is conservatively equal to the recommended factor for resident adult exposure to soil.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
kg/mg = kilograms per milligram
cm^2 /event = square centimeters per event
kg = kilogram

VALUES USED FOR ADOLESCENT RECREATIONAL USER
DAILY SEDIMENT INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Sediment	Chemical-Specific	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	mg/day	50	BPJ (1)	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	10	BPJ (3)	
	BW	Body Weight	kg	45	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	2,920	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	3,870	U.S. EPA 2011 (4)	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.2	U.S. EPA 2004 (5)	
	ABS	Dermal Absorption Fraction	Unitless	Chemical-Specific	U.S. EPA 2004	
	EF	Exposure Frequency	event/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	10	BPJ (3)	
	BW	Body Weight	kg	45	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	

(1) The incidental sediment ingestion rate is assumed to be equal to the soil ingestion rate presented in Table 5-1 of USEPA *Exposure Factors Handbook* and does not take into account dust ingestion.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Assumes age range of adolescent is 6 to 16 years of age.
(4) Skin surface area is taken from Table 7-17 and Table 7-9 of 2011 EFH. Table 7-17 notes 29% of exposed skin surface available for 5 to 17 year old during outdoor activities. Table 7-9 presents the total skin surface area for 6 to <11 years of age and 11 to <16 years of age for male and female combined.
(5) The adherence factor is conservatively equal to the recommended factor for resident child exposure to soil.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
kg/mg = kilograms per milligram
cm^2 /event = square centimeters per event
kg = kilogram

VALUES USED FOR CHILD RECREATIONAL USER
DAILY SEDIMENT INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Sediment	Chemical-Specific	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	mg/day	50	BPJ (1)	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	4	BPJ (3)	
	BW	Body Weight	kg	15	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	2,920	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	2,373	U.S. EPA 2011 (4)	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.2	U.S. EPA 2004 (5)	
	ABS	Dermal Absorption Fraction	Unitless	Chemical-Specific	U.S. EPA 2004	
	EF	Exposure Frequency	event/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	4	BPJ (3)	
	BW	Body Weight	kg	15	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	1,095	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	

(1) The incidental sediment ingestion rate is assumed to be equal to the soil ingestion rate presented in Table 5-1 of USEPA *Exposure Factors Handbook* and does not take into account dust ingestion.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Age range for child is assumed from 2 to 6 years. It is expected that children younger then 2 years will not have contact with surface water.
(4) Contact with sediment is assumed similar to a resident child exposed area for soil.
(5) The adherence factor is conservatively equal to the recommended factor for resident child exposure to soil.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
kg/mg = kilograms per milligram
cm^2 /event = square centimeters per event
kg = kilogram

VALUES USED FOR ADULT RECREATIONAL USER
DAILY FISH INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water/Sediment
Exposure Medium: Fish
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Fish Fillets	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	kg/meal	0.0263	U.S. EPA 2000	CS x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	meals/yr	365	U.S. EPA 2000	
	ED	Exposure Duration	yr	26	U.S. EPA 1989	
	BW	Body Weight	kg	80	U.S. EPA 1997b	
	AT-NC	Averaging time - Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake

mg/kg = milligrams per kilogram
kg/meal = kilograms per meal

yr = year
kg = kilogram

VALUES USED FOR ADOLESCENT RECREATIONAL USER
DAILY FISH INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water/Sediment
Exposure Medium: Fish
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Fish Fillets	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	kg/meal	0.0196	U.S. EPA 2000	CS x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	meals/yr	365	U.S. EPA 2000	
	ED	Exposure Duration	yr	10	BPJ	
	BW	Body Weight	kg	45	U.S. EPA 1997b	
	AT-NC	Averaging time - Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake

mg/kg = milligrams per kilogram
kg/meal = kilograms per meal

yr = year
kg = kilogram

VALUES USED FOR CHILD RECREATIONAL USER
DAILY FISH INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water/Sediment
Exposure Medium: Fish
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Fish Fillets	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	kg/meal	0.0098	U.S. EPA 2000	CS x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	meals/yr	365	U.S. EPA 2000	
	ED	Exposure Duration	yr	4	BPJ (1)	
	BW	Body Weight	kg	15	U.S. EPA 2008	
	AT-NC	Averaging time - Noncancer	days	1,095	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	

(1) Age range for child is assumed from 2 to 6 years. It is expected that children younger then 2 years will not consume significant amounts of fish.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
kg/meal = kilograms per meal
yr = year
kg = kilogram

VALUES USED FOR ADULT SUBSISTENCE FISHER
DAILY FISH INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water/Sediment
Exposure Medium: Fish
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Subsistence
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation / Model Name
Ingestion	CS	Chemical Concentration in Fish Fillets	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	kg/meal	0.146	U.S. EPA 2000, BPJ	CS x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	meals/yr	365	U.S. EPA 2000	
	ED	Exposure Duration	yr	20	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	7,300	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	

(1) The subsistence fisher is assumed to ingest an average of 146 grams of fish over an entire year.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
kg/meal = kilograms per meal
yr = year
kg = kilogram

Appendix B

Selection of Chemicals of Potential Concern for Ecological Receptors

Selection of Chemicals of Potential Concern for
Exposure Area 1: Upstream of the Siphon

Analyte	Benthos Tissue			Fish Tissue					Surface Soil				Sediment				Surface Water (Total)				Surface Water (Dissolved)				Selection of Chemicals of Potential Concern
	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Frequency	Maximum (mg/kg dry wt)	95UCLM (mg/kg dry wt)	Maximum (mg/kg wet wt)	95UCLM (mg/kg wet wt)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Aquatic Habitats
Metals																									
Aluminum	--	--	--	2/2	2.16E+01	2.16E+01	5.40E+00	5.40E+00	--	--	--	3.00E+04	11/11	1.41E+04	1.03E+04	NA	4/4	1.38E+03	1.38E+03	8.70E+01	--	--	--	8.70E+01	YES
Arsenic	--	--	--	--	--	--	--	--	--	--	--	1.80E+01	11/11	5.30E+00	4.24E+00	9.79E+00	4/4	4.70E+00	4.70E+00	1.50E+02	4/4	4.30E+00	4.30E+00	1.50E+02	NO
Barium	--	--	--	2/2	7.20E+00	7.20E+00	1.80E+00	1.80E+00	--	--	--	3.30E+02	11/11	1.66E+02	1.66E+02	NA	4/4	1.40E+02	1.40E+02	1.60E+04	4/4	1.25E+02	1.25E+02	1.60E+04	YES
Beryllium	--	--	--	--	--	--	--	--	--	--	--	1.00E+01	1/11	7.10E-01	7.10E-01	NA	--	--	--	5.30E+00	--	--	--	5.30E+00	YES
Cadmium	--	--	--	--	--	--	--	--	--	--	--	3.20E+01	2/11	3.30E-01	3.30E-01	9.90E-01	--	--	--	1.50E-01	--	--	--	1.50E-01	NO
Calcium	--	--	--	2/2	7.20E+04	7.20E+04	1.80E+04	1.80E+04	--	--	--	NA	11/11	8.07E+04	6.37E+04	NA	4/4	8.55E+04	8.55E+04	NA	4/4	8.27E+04	8.27E+04	NA	NO, Essential Nutrient
Chromium	--	--	--	2/2	1.12E+01	1.12E+01	2.80E+00	2.80E+00	--	--	--	4.00E-01	11/11	9.90E+00	8.03E+00	4.34E+01	1/4	6.30E-01	6.30E-01	4.20E+01	1/4	3.40E-01	3.40E-01	4.20E+01	NO
Cobalt	--	--	--	1/2	1.76E-01	1.76E-01	4.40E-02	4.40E-02	--	--	--	1.30E+01	11/11	6.00E+00	5.35E+00	5.00E+01	--	--	--	1.50E+03	--	--	--	1.50E+03	NO
Copper	--	--	--	2/2	8.40E+00	8.40E+00	2.10E+00	2.10E+00	--	--	--	7.00E+01	9/11	8.80E+00	6.97E+00	3.16E+01	3/4	3.00E+00	3.00E+00	5.24E+00	2/4	2.40E+00	2.40E+00	5.24E+00	NO
Iron	--	--	--	2/2	2.08E+02	2.08E+02	5.20E+01	5.20E+01	--	--	--	1.50E+04	11/11	1.67E+04	1.33E+04	2.00E+04	4/4	1.16E+03	1.16E+03	1.00E+03	1/4	1.37E+02	1.37E+02	1.00E+03	NO, Essential Nutrient
Lead	--	--	--	1/2	1.48E-01	1.48E-01	3.70E-02	3.70E-02	--	--	--	1.20E+02	11/11	9.00E+00	7.80E+00	3.58E+01	4/4	1.40E+00	1.40E+00	1.17E+00	--	--	--	1.17E+00	YES
Magnesium	--	--	--	2/2	4.80E+03	4.80E+03	1.20E+03	1.20E+03	--	--	--	NA	11/11	6.26E+03	4.21E+03	NA	4/4	3.20E+04	3.20E+04	3.24E+03	4/4	3.18E+04	3.18E+04	3.24E+03	NO, Essential Nutrient
Manganese	--	--	--	2/2	1.12E+01	1.12E+01	2.80E+00	2.80E+00	--	--	--	2.20E+02	11/11	3.54E+02	2.89E+02	4.60E+02	4/4	1.06E+02	1.06E+02	1.20E+02	4/4	8.40E+00	8.40E+00	1.20E+02	NO
Mercury	--	--	--	2/2	1.88E+00	1.88E+00	4.70E-01	4.70E-01	--	--	--	1.00E-01	11/11	1.50E-01	6.30E-02	1.80E-01	--	--	--	1.30E+00	--	--	--	1.30E+00	NO
Nickel	--	--	--	2/2	1.04E+00	1.04E+00	2.60E-01	2.60E-01	--	--	--	3.80E+01	11/11	1.08E+01	8.28E+00	2.27E+01	4/4	1.60E+00	1.60E+00	2.89E+01	1/4	1.10E+00	1.10E+00	2.89E+01	NO
Potassium	--	--	--	2/2	1.16E+04	1.16E+04	2.90E+03	2.90E+03	--	--	--	NA	9/11	2.98E+03	2.31E+03	NA	4/4	7.17E+03	7.17E+03	NA	4/4	6.90E+03	6.90E+03	NA	NO, Essential Nutrient
Selenium	--	--	--	2/2	1.40E+00	1.40E+00	3.50E-01	3.50E-01	--	--	--	5.20E-01	--	--	--	NA	3/4	1.60E+00	1.60E+00	5.00E+00	3/4	1.50E+00	1.50E+00	5.00E+00	NO
Sodium	--	--	--	2/2	5.20E+03	5.20E+03	1.30E+03	1.30E+03	--	--	--	NA	1/11	7.72E+02	7.72E+02	NA	4/4	1.70E+05	1.70E+05	NA	4/4	1.74E+05	1.74E+05	NA	NO, Essential Nutrient
Vanadium	--	--	--	2/2	2.24E+00	2.24E+00	5.60E-01	5.60E-01	--	--	--	2.00E+00	11/11	1.98E+01	1.71E+01	NA	4/4	9.60E+00	9.60E+00	2.00E+01	4/4	9.00E+00	9.00E+00	2.00E+01	YES
Zinc	--	--	--	2/2	8.00E+01	8.00E+01	2.00E+01	2.00E+01	--	--	--	1.20E+02	11/11	3.90E+01	3.73E+01	1.21E+02	4/4	4.10E+00	4.10E+00	6.57E+01	3/4	2.30E+00	2.30E+00	6.57E+01	NO
PCBS																									
Aroclor-1260	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	1/22	7.40E-04	7.40E-04	5.00E-03	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC
Total PCB Congeners	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	10/10	7.70E-03	3.27E-03	5.98E-02	9/9	4.40E-04	3.45E-04	1.40E-02	--	--	--	1.40E-02	YES, main COPC
Total PCB Aroclors	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	1/1	7.40E-04	7.40E-04	5.98E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC
PESTICIDES																									
DDTr	--	--	--	2/2	3.98E-01	3.98E-01	9.94E-02	9.94E-02	--	--	--	NA	9/13	5.40E-02	5.40E-02	5.28E-03	--	--	--	NA	--	--	--	NA	YES
delta-BHC	--	--	--	--	--	--	--	--	--	--	--	NA	1/13	9.10E-04	9.10E-04	3.00E-03	--	--	--	1.41E+02	--	--	--	1.41E+02	NO
PAHs																									
Total HMW PAHs	--	--	--	--	--	--	--	--	--	--	--	1.80E+01	1/1	7.19E-01	7.19E-01	1.70E+00	--	--	--	NA	--	--	--	NA	NO
SVOCS																									
Bis(2-ethylhexyl)phthalate	--	--	--	--	--	--	--	--	--	--	--	NA	6/13	6.10E-01	3.00E-01	1.80E-01	--	--	--	3.00E+02	--	--	--	3.00E+02	YES
Diethyl phthalate	--	--	--	1/2	3.04E-01	3.04E-01	7.60E-02	7.60E-02	--	--	--	1.00E+02	--	--	--	6.30E-01	1/4	1.10E+00	1.10E+00	1.04E+03	--	--	--	1.04E+03	NO
Phenol	--	--	--	1/2	4.80E-02	4.80E-02	1.20E-02	1.20E-02	--	--	--	3.00E+01	4/13	6.70E-02	6.70E-02	NA	--	--	--	1.10E+02	--	--	--	1.10E+02	YES
VOCS																									
Acetone	--	--	--	--	--	--	--	--	--	--	--	NA	1/4	5.20E-02	5.20E-02	6.00E+01	--	--	--	1.01E+05	--	--	--	1.01E+05	NO
Acetophenone	--	--	--	--	--	--	--	--	--	--	--	NA	6/13	8.30E-02	7.41E-02	NA	--	--	--	NA	--	--	--	NA	YES
Methylene chloride	--	--	--	--	--	--	--	--	--	--	--	NA	1/4	4.40E-03	4.40E-03	7.75E+00	--	--	--	1.10E+04	--	--	--	1.10E+04	NO
Toluene	--	--	--	--	--	--	--	--	--	--	--	2.00E+02	1/4	2.70E-03	2.70E-03	2.88E+00	--	--	--	1.45E+03	--	--	--	1.45E+03	NO

Note:
95UCLM: 95 percent upper confidence limit on the mean
--: No data available
COPC: Chemical of potential concern
Selection of Chemicals of Potential Concern: if an analyte exceeds the screening criteria in any media or no screening is available, the analyte is retained as a COPC

Selection of Chemicals of Potential Concern for
Exposure Area 2: Arroyo Colorado

Analyte	Benthos Tissue			Fish Tissue					Surface Soil				Sediment				Surface Water (Total)				Surface Water (Dissolved)				Selection of Chemicals of Potential Concern
	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Frequency	Maximum (mg/kg dry wt)	95UCLM (mg/kg dry wt)	Maximum (mg/kg wet wt)	95UCLM (mg/kg wet wt)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Aquatic Habitats
Metals																									
Aluminum	--	--	--	2/2	2.28E+02	2.28E+02	5.70E+01	5.70E+01	--	--	--	3.00E+04	14/14	2.40E+03	2.40E+03	NA	7/7	2.21E+03	1.37E+03	8.70E+01	--	--	--	8.70E+01	YES
Arsenic	--	--	--	2/2	3.68E-01	3.68E-01	9.20E-02	9.20E-02	--	--	--	1.80E+01	14/14	6.60E+00	5.07E+00	9.79E+00	7/7	1.51E+01	1.39E+01	1.50E+02	7/7	1.27E+01	1.27E+01	1.50E+02	NO
Barium	--	--	--	2/2	1.56E+01	1.56E+01	3.90E+00	3.90E+00	--	--	--	3.30E+02	14/14	2.55E+02	1.98E+02	NA	7/7	1.64E+02	1.41E+02	1.60E+04	7/7	1.52E+02	1.20E+02	1.60E+04	YES
Beryllium	--	--	--	--	--	--	--	--	--	--	--	1.00E+01	8/14	9.80E-01	7.85E-01	NA	--	--	--	5.30E+00	--	--	--	5.30E+00	YES
Cadmium	--	--	--	--	--	--	--	--	--	--	--	3.20E+01	14/14	4.90E-01	4.14E-01	9.90E-01	1/7	1.70E-01	1.70E-01	1.50E-01	--	--	--	1.50E-01	YES
Calcium	--	--	--	2/2	4.80E+04	4.80E+04	1.20E+04	1.20E+04	--	--	--	NA	14/14	1.00E+05	8.83E+04	NA	7/7	2.19E+05	1.85E+05	NA	7/7	2.02E+05	1.83E+05	NA	NO, essential nutrient
Chromium	--	--	--	1/2	1.84E-01	1.84E-01	4.60E-02	4.60E-02	--	--	--	4.00E-01	14/14	1.67E+01	1.29E+01	4.34E+01	2/7	2.70E+00	2.70E+00	4.20E+01	--	--	--	4.20E+01	NO
Cobalt	--	--	--	2/2	2.88E-01	2.88E-01	7.20E-02	7.20E-02	--	--	--	1.30E+01	14/14	7.20E+00	6.01E+00	5.00E+01	3/7	2.00E+00	2.00E+00	1.50E+03	--	--	--	1.50E+03	NO
Copper	--	--	--	2/2	3.52E+00	3.52E+00	8.80E-01	8.80E-01	--	--	--	7.00E+01	14/14	1.69E+01	1.26E+01	3.16E+01	7/7	9.20E+00	7.47E+00	5.24E+00	7/7	7.10E+00	5.71E+00	5.24E+00	YES
Iron	--	--	--	2/2	3.00E+02	3.00E+02	7.50E+01	7.50E+01	--	--	--	1.50E+04	14/14	2.19E+04	1.82E+04	2.00E+04	6/7	1.80E+03	1.16E+03	1.00E+03	1/7	8.54E+02	8.54E+02	1.00E+03	NO, essential nutrient
Lead	--	--	--	2/2	5.20E-01	5.20E-01	1.30E-01	1.30E-01	--	--	--	1.20E+02	14/14	1.37E+01	1.07E+01	3.58E+01	7/7	4.30E+00	2.82E+00	1.17E+00	1/7	2.50E-01	2.50E-01	1.17E+00	YES
Magnesium	--	--	--	2/2	1.52E+03	1.52E+03	3.80E+02	3.80E+02	--	--	--	NA	14/14	8.35E+03	6.72E+03	NA	7/7	7.61E+04	6.22E+04	3.24E+03	7/7	7.62E+04	6.51E+04	3.24E+03	NO, essential nutrient
Manganese	--	--	--	2/2	9.20E+01	9.20E+01	2.30E+01	2.30E+01	--	--	--	2.20E+02	14/14	1.18E+03	6.82E+02	4.60E+02	7/7	3.42E+02	2.52E+02	1.20E+02	7/7	1.38E+02	8.93E+01	1.20E+02	YES
Mercury	--	--	--	2/2	1.68E-01	1.68E-01	4.20E-02	4.20E-02	--	--	--	1.00E-01	13/14	2.20E-01	1.12E-01	1.80E-01	1/7	6.00E-02	6.00E-02	1.30E+00	--	--	--	1.30E+00	YES
Nickel	--	--	--	1/2	1.52E-01	1.52E-01	3.80E-02	3.80E-02	--	--	--	3.80E+01	14/14	1.49E+01	1.23E+01	2.27E+01	7/7	4.30E+00	3.78E+00	2.89E+01	7/7	2.30E+00	2.08E+00	2.89E+01	NO
Potassium	--	--	--	2/2	1.04E+04	1.04E+04	2.60E+03	2.60E+03	--	--	--	NA	14/14	5.62E+03	4.33E+03	NA	7/7	1.38E+04	1.20E+04	NA	7/7	1.36E+04	1.24E+04	NA	NO, essential nutrient
Selenium	--	--	--	2/2	1.48E+00	1.48E+00	3.70E-01	3.70E-01	--	--	--	5.20E-01	--	--	--	NA	2/7	5.60E+00	5.60E+00	5.00E+00	7/7	6.00E+00	6.00E+00	5.00E+00	YES
Sodium	--	--	--	2/2	4.80E+03	4.80E+03	1.20E+03	1.20E+03	--	--	--	NA	14/14	2.12E+03	1.54E+03	NA	7/7	5.62E+05	4.37E+05	NA	7/7	5.49E+05	4.49E+05	NA	NO, essential nutrient
Vanadium	--	--	--	--	--	--	--	--	--	--	--	2.00E+00	14/14	2.85E+01	2.37E+01	NA	7/7	1.58E+01	1.43E+01	2.00E+01	7/7	1.18E+01	1.09E+01	2.00E+01	YES
Zinc	--	--	--	2/2	1.92E+02	1.92E+02	4.80E+01	4.80E+01	--	--	--	1.20E+02	14/14	7.45E+01	5.54E+01	1.21E+02	7/7	1.86E+01	1.49E+01	6.57E+01	7/7	6.40E+00	5.50E+00	6.57E+01	NO
PCBS																									
Aroclor-1260	--	--	--	1/2	3.04E-02	3.04E-02	7.60E-03	7.60E-03	--	--	--	4.00E+01	5/22	5.60E-03	4.58E-03	5.00E-03	--	--	--	1.40E-02	--	--	--	1.40E-02	YES
Total PCB Congeners	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	4/4	1.20E-02	1.20E-02	5.98E-02	4/4	1.20E-03	1.20E-03	1.40E-02	--	--	--	1.40E-02	YES, main COPC
Total PCB Aroclors	--	--	--	1/2	3.04E-02	3.04E-02	7.60E-03	7.60E-03	--	--	--	4.00E+01	5/22	5.60E-03	4.58E-03	5.98E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC
PESTICIDES																									
DDTr	--	--	--	2/2	1.57E+00	1.57E+00	3.92E-01	3.92E-01	--	--	--	NA	3/14	1.30E-02	1.30E-02	5.28E-03	--	--	--	NA	--	--	--	NA	YES
gamma-BHC (Lindane)	--	--	--	2/2	6.00E-04	6.00E-04	1.50E-04	1.50E-04	--	--	--	NA	--	--	--	2.37E-03	1/7	1.70E-02	1.70E-02	8.00E-02	--	--	--	8.00E-02	NO
SVOCS																									
Bis(2-ethylhexyl)phthalate	--	--	--	--	--	--	--	--	--	--	--	NA	3/14	1.20E-01	1.20E-01	1.80E-01	3/7	1.40E+02	1.40E+02	3.00E+02	--	--	--	3.00E+02	NO
VOCS																									
Acetone	--	--	--	--	--	--	--	--	--	--	--	NA	1/3	4.80E-02	4.80E-02	6.00E+01	--	--	--	1.01E+05	--	--	--	1.01E+05	NO
Acetophenone	--	--	--	1/2	2.32E-02	2.32E-02	5.80E-03	5.80E-03	--	--	--	NA	--	--	--	NA	1/7	2.10E+00	2.10E+00	NA	--	--	--	NA	YES

Note:
95UCLM: 95 percent upper confidence limit on the mean
--: No data available
COPC: Chemical of potential concern
Selection of Chemicals of Potential Concern: if an analyte exceeds the screening criteria in any media or no screening is available, the analyte is retained as a COPᵇ

Selection of Chemicals of Potential Concern
for Exposure Area 3: LWMCU at the Siphon Exit

Analyte	Benthos Tissue					Fish Tissue					Surface Soil				Sediment				Surface Water (Total)				Surface Water (Dissolved)				Selection of Chemicals of Potential Concern
	Frequency	Maximum (mg/kg dry wt)	95UCLM (mg/kg dry wt)	Maximum (mg/kg wet wt)	95UCLM (mg/kg wet wt)	Frequency	Maximum (mg/kg dry wt)	95UCLM (mg/kg dry wt)	Maximum (mg/kg wet wt)	95UCLM (mg/kg wet wt)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Aquatic Habitats
Metals																											
Aluminum	--	--	--	--	--	4/4	2.00E+03	2.00E+03	5.00E+02	5.00E+02	--	--	--	3.00E+04	11/11	1.40E+04	1.17E+04	NA	3/3	1.94E+03	1.94E+03	8.70E+01	--	--	--	8.70E+01	YES
Antimony	--	--	--	--	--	2/4	1.88E-01	1.88E-01	4.70E-02	4.70E-02	--	--	--	5.00E+00	--	--	--	2.00E+00	--	--	--	1.60E+02	--	--	--	1.60E+02	NO
Arsenic	--	--	--	--	--	2/4	1.12E+00	1.12E+00	2.80E-01	2.80E-01	--	--	--	1.80E+01	11/11	4.70E+00	4.24E+00	9.79E+00	3/3	4.70E+00	4.70E+00	1.50E+02	3/3	4.10E+00	4.10E+00	1.50E+02	NO
Barium	--	--	--	--	--	4/4	2.64E+01	2.64E+01	6.60E+00	6.60E+00	--	--	--	3.30E+02	11/11	2.72E+02	1.86E+02	NA	3/3	1.52E+02	1.52E+02	1.60E+04	3/3	1.24E+02	1.24E+02	1.60E+04	YES
Beryllium	--	--	--	--	--	1/4	8.40E-02	8.40E-02	2.10E-02	2.10E-02	--	--	--	1.00E+01	1/11	6.00E-01	6.00E-01	NA	--	--	--	5.30E+00	--	--	--	5.30E+00	YES
Cadmium	--	--	--	--	--	1/4	5.20E-02	5.20E-02	1.30E-02	1.30E-02	--	--	--	3.20E+01	11/11	3.80E-01	3.05E-01	9.90E-01	--	--	--	1.50E-01	--	--	--	1.50E-01	NO
Calcium	--	--	--	--	--	4/4	4.80E+04	4.80E+04	1.20E+04	1.20E+04	--	--	--	NA	11/11	1.68E+05	1.17E+05	NA	3/3	8.60E+04	8.60E+04	NA	3/3	8.20E+04	8.20E+04	NA	NO, essential nutrient
Chromium	--	--	--	--	--	4/4	3.00E+00	3.00E+00	7.50E-01	7.50E-01	--	--	--	4.00E-01	11/11	1.08E+01	8.54E+00	4.34E+01	--	--	--	4.20E+01	1/3	2.90E-01	2.90E-01	4.20E+01	NO
Cobalt	--	--	--	--	--	3/4	1.04E+00	1.04E+00	2.60E-01	2.60E-01	--	--	--	1.30E+01	11/11	7.70E+00	6.62E+00	5.00E+01	--	--	--	1.50E+03	--	--	--	1.50E+03	NO
Copper	--	--	--	--	--	4/4	1.24E+01	1.24E+01	3.10E+00	3.10E+00	--	--	--	7.00E+01	11/11	2.15E+01	1.17E+01	3.16E+01	3/3	2.80E+00	2.80E+00	5.24E+00	1/3	2.20E+00	2.20E+00	5.24E+00	NO
Iron	--	--	--	--	--	4/4	2.28E+03	2.28E+03	5.70E+02	5.70E+02	--	--	--	1.50E+04	11/11	1.65E+04	1.42E+04	2.00E+04	3/3	1.67E+03	1.67E+03	1.00E+03	--	--	--	1.00E+03	NO, essential nutrient
Lead	--	--	--	--	--	3/4	2.20E+00	2.20E+00	5.50E-01	5.50E-01	--	--	--	1.20E+02	11/11	1.27E+01	9.84E+00	3.58E+01	3/3	1.80E+00	1.80E+00	1.17E+00	--	--	--	1.17E+00	YES
Magnesium	--	--	--	--	--	4/4	1.76E+03	1.76E+03	4.40E+02	4.40E+02	--	--	--	NA	11/11	5.45E+03	4.49E+03	NA	3/3	3.11E+04	3.11E+04	3.24E+03	3/3	3.14E+04	3.14E+04	3.24E+03	NO, essential nutrient
Manganese	--	--	--	--	--	4/4	1.24E+02	1.24E+02	3.10E+01	3.10E+01	--	--	--	2.20E+02	11/11	6.95E+02	4.34E+02	4.60E+02	3/3	1.26E+02	1.26E+02	1.20E+02	3/3	9.50E+00	9.50E+00	1.20E+02	YES
Mercury	--	--	--	--	--	4/4	9.20E-01	9.20E-01	2.30E-01	2.30E-01	--	--	--	1.00E-01	11/11	7.70E-02	5.39E-02	1.80E-01	--	--	--	1.30E+00	--	--	--	1.30E+00	NO
Nickel	--	--	--	--	--	4/4	2.00E+00	2.00E+00	5.00E-01	5.00E-01	--	--	--	3.80E+01	11/11	1.01E+01	8.34E+00	2.27E+01	3/3	2.00E+00	2.00E+00	2.89E+01	--	--	--	2.89E+01	NO
Potassium	--	--	--	--	--	4/4	1.28E+04	1.28E+04	3.20E+03	3.20E+03	--	--	--	NA	11/11	3.25E+03	2.66E+03	NA	3/3	7.10E+03	7.10E+03	NA	3/3	6.94E+03	6.94E+03	NA	NO, essential nutrient
Selenium	--	--	--	--	--	4/4	9.20E-01	9.20E-01	2.30E-01	2.30E-01	--	--	--	5.20E-01	4/11	2.10E-01	2.10E-01	NA	3/3	7.70E-01	7.70E-01	5.00E+00	2/3	1.60E+00	1.60E+00	5.00E+00	YES
Silver	--	--	--	--	--	1/4	2.68E-01	2.68E-01	6.70E-02	6.70E-02	--	--	--	5.60E+02	--	--	--	1.00E+00	--	--	--	1.00E-01	--	--	--	1.00E-01	NO
Sodium	--	--	--	--	--	4/4	5.60E+03	5.60E+03	1.40E+03	1.40E+03	--	--	--	NA	5/11	1.17E+03	8.57E+02	NA	3/3	1.62E+05	1.62E+05	NA	3/3	1.63E+05	1.63E+05	NA	NO, essential nutrient
Thallium	--	--	--	--	--	1/4	5.60E-02	5.60E-02	1.40E-02	1.40E-02	--	--	--	1.00E+00	--	--	--	NA	--	--	--	4.00E+00	--	--	--	4.00E+00	NO
Vanadium	--	--	--	--	--	4/4	6.40E+00	6.40E+00	1.60E+00	1.60E+00	--	--	--	2.00E+00	11/11	2.17E+01	1.80E+01	NA	3/3	1.11E+01	1.11E+01	2.00E+01	3/3	9.00E+00	9.00E+00	2.00E+01	YES
Zinc	--	--	--	--	--	4/4	4.00E+02	4.00E+02	1.00E+02	1.00E+02	--	--	--	1.20E+02	11/11	5.11E+01	4.10E+01	1.21E+02	3/3	6.20E+00	6.20E+00	6.57E+01	2/3	1.60E+00	1.60E+00	6.57E+01	NO
PCBS																											
Aroclor-1016	--	--	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	--	--	--	7.00E-03	--	--	--	1.40E-02	--	--	--	1.40E-02	NO
Aroclor-1221	--	--	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	1/70	2.10E-03	2.10E-03	3.00E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC
Aroclor-1242	--	--	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	1/70	1.70E-01	1.70E-01	3.00E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES
Aroclor-1248	--	--	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	1/70	1.00E-03	1.00E-03	3.00E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC
Aroclor-1254	16/16	7.60E-01	3.38E-01	1.90E-01	8.45E-02	11/12	4.40E+00	3.03E+00	1.10E+00	7.58E-01	--	--	--	4.00E+01	56/70	1.10E+01	1.37E+00	6.00E-02	1/20	1.50E-02	1.50E-02	1.40E-02	--	--	--	1.40E-02	YES
Aroclor-1260	--	--	--	--	--	--	--	--	--	--	--	--	--	4.00E+01	10/70	1.80E-01	1.17E-02	5.00E-03	--	--	--	1.40E-02	--	--	--	1.40E-02	YES
Total PCB Congeners	7/7	2.80E+00	1.79E+00	7.00E-01	4.47E-01	3/3	2.04E+01	2.04E+01	5.10E+00	5.10E+00	--	--	--	4.00E+01	17/17	6.10E+00	2.71E+00	5.98E-02	19/19	2.60E-02	5.81E-03	1.40E-02	--	--	--	1.40E-02	YES
Total PCB Aroclors	16/16	7.60E-01	3.38E-01	1.90E-01	8.45E-02	11/11	4.40E+00	2.80E+00	1.10E+00	6.99E-01	--	--	--	4.00E+01	58/58	1.10E+01	1.05E+00	5.98E-02	1/1	1.50E-02	1.50E-02	1.40E-02	--	--	--	1.40E-02	YES
PESTICIDES																											
DDTr	--	--	--	--	--	4/4	7.68E-01	7.68E-01	1.92E-01	1.92E-01	--	--	--	NA	11/11	7.80E-02	4.02E-02	5.28E-03	--	--	--	NA	--	--	--	NA	YES
Aldrin	--	--	--	--	--	2/4	8.00E-03	8.00E-03	2.00E-03	2.00E-03	--	--	--	NA	--	--	--	2.00E-03	--	--	--	3.00E-01	--	--	--	3.00E-01	NO
alpha-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	6.00E-03	--	--	--	7.40E+01	--	--	--	7.40E+01	NO
alpha-Chlordane	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	3/11	2.40E-03	2.40E-03	3.24E-03	--	--	--	4.00E-03	--	--	--	4.00E-03	NO
beta-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	1/11	2.10E-03	2.10E-03	5.00E-03	--	--	--	8.30E+01	--	--	--	8.30E+01	NO
delta-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	1/11	9.90E-04	9.90E-04	3.00E-03	--	--	--	1.41E+02	--	--	--	1.41E+02	NO
Dieldrin	--	--	--	--	--	4/4	1.96E-02	1.96E-02	4.90E-03	4.90E-03	--	--	--	NA	6/11	1.90E-02	7.90E-03	1.90E-03	--	--	--	2.00E-03	--	--	--	2.00E-03	YES
Endosulfan I	--	--	--	--	--	2/4	1.08E-02	1.08E-02	2.70E-03	2.70E-03	--	--	--	NA	3/11	2.10E-03	2.10E-03	NA	--	--	--	5.60E-02	--	--	--	5.60E-02	YES
Endosulfan II	--	--	--	--	--	3/4	4.80E-03	4.80E-03	1.20E-03	1.20E-03	--	--	--	NA	6/11	6.10E-03	3.02E-03	NA	--	--	--	5.60E-02	--	--	--	5.60E-02	YES
Endosulfan sulfate	--	--	--	--	--	4/4	2.36E-02	2.36E-02	5.90E-03	5.90E-03	--	--	--	NA	--	--	--	NA	--	--	--	5.60E-02	--	--	--	5.60E-02	NO
Endrin	--	--	--	--	--	4/4	3.16E-01	3.16E-01	7.90E-02	7.90E-02	--	--	--	NA	6/11	8.60E-03	5.20E-03	2.22E-03	--	--	--	2.00E-03	--	--	--	2.00E-03	YES
Endrin aldehyde	--	--	--	--	--	3/4	2.76E-02	2.76E-02	6.90E-03	6.90E-03	--	--	--	NA	5/11	6.50E-03	4.18E-03	NA	--	--	--	1.21E+03	--	--	--	1.21E+03	YES
Endrin ketone	--	--	--	--	--	2/4	9.60E-02	9.60E-02	2.40E-02	2.40E-02	--	--	--	NA	--	--	--	NA	--	--	--	NA	--	--	--	NA	NO
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	1/11	5.80E-04	5.80E-04	2.37E-03	--	--	--	8.00E-02	--	--	--	8.00E-02	NO
gamma-Chlordane	--	--	--	--	--	4/4	1.00E-01	1.00E-01	2.50E-02	2.50E-02	--	--	--	NA	11/11	1.80E-02	1.14E-02	3.24E-03	--	--	--	4.00E-03	--	--	--	4.00E-03	YES
Heptachlor	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	NA	--	--	--	4.00E-03	--	--	--	4.00E-03	NO
Heptachlor epoxide	--	--	--	--	--	4/4	1.08E-02	1.08E-02	2.70E-03	2.70E-03	--	--	--	NA	11/11	8.60E-03	4.24E-03	2.47E-03	--	--	--	3.80E-03	--	--	--	3.80E-03	YES
Methoxychlor	--	--	--	--	--	4/4	2.04E-01	2.04E-01	5.10E-02	5.10E-02	--	--	--	NA	--	--	--	NA	--	--	--	3.00E-02	--	--	--	3.00E-02	NO
Toxaphene	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	1.00E-04	--	--	--	2.00E-04	--	--	--	2.00E-04	NO
PAHs																											
Total LMW PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	2.90E+01	1/11	9.36E-01	9.36E-01	5.52E-01	--	--	--	NA	--	--	--	NA	YES
Total HMW PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	1.80E+01	3/11	2.74E+00	2.74E+00	1.70E+00	--	--	--	NA	--	--	--	NA	YES
SVOCS																											
2-Methylphenol	--	--	--	--	--	1/4	6.40E-02	6.40E-02	1.60E-02	1.60E-02	--	--	--	NA	--	--	--	NA	--	--	--	5.60E+02	--	--	--	5.60E+02	NO
3-&4-Methylphenols	--	--	--	--	--	2/4	3.36E-01	3.36E-01	8.40E-02	8.40E-02	--	--	--	NA	--	--	--	NA	--	--	--	2.72E+02	--	--	--	2.72E+02	NO
Benzaldehyde	--	--	--	--	--	4/4	1.84E+00	1.84E+00	4.60E-01	4.60E-01	--	--	--	NA	--	--	--	NA	--	--	--	NA	--	--	--	NA	NO
Bis(2-ethylhexyl)phthalate	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	2/11	6.70E-01	6.70E-01	1.80E-01	--	--	--	3.00E+02	--	--	--	3.00E+02	YES
Butylbenzylphthalate	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	NA	--	--	--	9.30E+01	--	--	--	9.30E+01	NO
Caprolactam	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	NA	--	--	--	NA	--	--	--	NA	NO
Carbazole	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	1/11	8.60E-02	8.60E-02	NA	--	--	--	NA	--	--	--	NA	YES
Dibenzofuran	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	NA	--	--	--	9.40E+01	--	--	--	9.40E+01	NO
Diethyl phthalate	--	--	--	--	--	1/4	1.60E-01	1.60E-01	4.00E-02	4.00E-02	--	--	--	1.00E+02	--	--	--	6.30E-01	--	--	--	1.04E+03	--	--	--	1.04E+03	NO
Di-n-butyl phthalate	--	--	--	--	--	--	--	--	--	--	--	--	--	2.00E+02	1/11	2.00E-01	2.00E-01	NA	--	--	--	7.00E+00	--	--	--	7.00E+00	YES
Phenol	--	--	--	--	--	3/4	4.40E-01	4.40E-01	1.10E-01	1.10E-01	--	--	--	3.00E+01	3/11	8.30E-02	8.30E-02	NA	--	--	--	1.10E+02	--	--	--	1.10E+02	YES
VOCS																											
Acetone	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	6.00E+01	--	--	--	1.01E+05	--	--	--	1.01E+05	NO
Acetophenone	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	3/11	1.20E-01	1.20E-01	NA	--	--	--	NA	--	--	--	NA	YES
Bromodichloromethane	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	2.46E+00	--	--	--	2.16E+03	--	--	--	2.16E+03	NO
Bromoform	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	NA	--	--	--	1.49E+02	--	--	--	1.49E+02	NO
Chloroform	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	9.40E-01	--	--	--	8.90E+02	--	--	--	8.90E+02	NO
Dibromochloromethane	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	1.60E-01	--	--	--	1.29E+02	--	--	--	1.29E+02	NO
Methylene chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	7.75E+00	--	--	--	1.10E+04	--	--	--	1.10E+04	NO
Toluene	--	--	--	--	--	--	--	--	--	--	--	--	--	2.00E+02	--	--	--	2.88E+00	--	--	--	1.45E+03	--	--	--	1.45E+03	NO

Note:
95UCLM: 95 percent upper confidence limit on the mean
--: No data available
COPC: Chemical of potential concern
Selection of Chemicals of Potential Concern: if an analyte exceeds the screening criteria in any media or no screening is available, the analyte is retained as a COPC

Selection of Chemicals of Potential Concern
for Exposure Area 4: LWMCU Downstream of the Siphon

Analyte	Benthos Tissue					Fish Tissue					Surface Soil				Sediment				Surface Water (Total)				Surface Water (Dissolved)				Selection of Chemicals of Potential Concern
	Frequency	Maximum (mg/kg dry wt)	95UCLM (mg/kg dry wt)	Maximum (mg/kg wet wt)	95UCLM (mg/kg wet wt)	Frequency	Maximum (mg/kg dry wt)	95UCLM (mg/kg dry wt)	Maximum (mg/kg wet wt)	95UCLM (mg/kg wet wt)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Aquatic Habitats
Metals																											
Aluminum	--	--	--	--	--	4/4	2.00E+03	2.00E+03	5.00E+02	5.00E+02	--	--	--	3.00E+04	8/8	2.19E+04	1.74E+04	NA	2/2	1.60E+03	1.60E+03	8.70E+01	--	--	--	8.70E+01	YES
Arsenic	--	--	--	--	--	2/4	1.12E+00	1.12E+00	2.80E-01	2.80E-01	--	--	--	1.80E+01	8/8	4.90E+00	4.45E+00	9.79E+00	2/2	4.90E+00	4.90E+00	1.50E+02	2/2	4.20E+00	4.20E+00	1.50E+02	NO
Barium	--	--	--	--	--	4/4	2.64E+01	2.64E+01	6.60E+00	6.60E+00	--	--	--	3.30E+02	8/8	2.10E+02	1.81E+02	NA	2/2	1.46E+02	1.46E+02	1.60E+04	2/2	1.28E+02	1.28E+02	1.60E+04	YES
Cadmium	--	--	--	--	--	1/4	5.20E-02	5.20E-02	1.30E-02	1.30E-02	--	--	--	3.20E+01	8/8	4.90E-01	3.98E-01	9.90E-01	--	--	--	1.50E-01	--	--	--	1.50E-01	NO
Calcium	--	--	--	--	--	4/4	4.80E+04	4.80E+04	1.20E+04	1.20E+04	--	--	--	NA	8/8	1.13E+05	9.39E+04	NA	2/2	8.76E+04	8.76E+04	NA	2/2	8.44E+04	8.44E+04	NA	NO, essential nutrient
Chromium	--	--	--	--	--	4/4	3.00E+00	3.00E+00	7.50E-01	7.50E-01	--	--	--	4.00E-01	8/8	1.51E+01	1.16E+01	4.34E+01	--	--	--	4.20E+01	1/2	3.90E-01	3.90E-01	4.20E+01	NO
Cobalt	--	--	--	--	--	3/4	1.04E+00	1.04E+00	2.60E-01	2.60E-01	--	--	--	1.30E+01	8/8	6.40E+00	6.03E+00	5.00E+01	--	--	--	1.50E+03	--	--	--	1.50E+03	NO
Copper	--	--	--	--	--	4/4	1.24E+01	1.24E+01	3.10E+00	3.10E+00	--	--	--	7.00E+01	8/8	1.42E+01	1.07E+01	3.16E+01	2/2	3.10E+00	3.10E+00	5.24E+00	1/2	2.20E+00	2.20E+00	5.24E+00	NO
Iron	--	--	--	--	--	4/4	2.28E+03	2.28E+03	5.70E+02	5.70E+02	--	--	--	1.50E+04	8/8	2.21E+04	1.82E+04	2.00E+04	2/2	1.34E+03	1.34E+03	1.00E+03	--	--	--	1.00E+03	NO, essential nutrient
Lead	--	--	--	--	--	3/4	2.20E+00	2.20E+00	5.50E-01	5.50E-01	--	--	--	1.20E+02	8/8	1.56E+01	1.26E+01	3.58E+01	2/2	1.60E+00	1.60E+00	1.17E+00	--	--	--	1.17E+00	YES
Magnesium	--	--	--	--	--	4/4	1.76E+03	1.76E+03	4.40E+02	4.40E+02	--	--	--	NA	8/8	7.19E+03	6.05E+03	NA	2/2	3.22E+04	3.22E+04	3.24E+03	2/2	3.21E+04	3.21E+04	3.24E+03	NO, essential nutrient
Manganese	--	--	--	--	--	4/4	1.24E+02	1.24E+02	3.10E+01	3.10E+01	--	--	--	2.20E+02	8/8	5.42E+02	4.37E+02	4.60E+02	2/2	1.14E+02	1.14E+02	1.20E+02	2/2	5.40E+00	5.40E+00	1.20E+02	YES
Mercury	--	--	--	--	--	4/4	9.20E-01	9.20E-01	2.30E-01	2.30E-01	--	--	--	1.00E-01	8/8	1.00E-01	7.47E-02	1.80E-01	--	--	--	1.30E+00	--	--	--	1.30E+00	NO
Nickel	--	--	--	--	--	4/4	2.00E+00	2.00E+00	5.00E-01	5.00E-01	--	--	--	3.80E+01	8/8	1.35E+01	1.09E+01	2.27E+01	2/2	1.80E+00	1.80E+00	2.89E+01	1/2	1.10E+00	1.10E+00	2.89E+01	NO
Potassium	--	--	--	--	--	4/4	1.28E+04	1.28E+04	3.20E+03	3.20E+03	--	--	--	NA	8/8	4.90E+03	3.91E+03	NA	2/2	7.02E+03	7.02E+03	NA	2/2	6.99E+03	6.99E+03	NA	NO, essential nutrient
Selenium	--	--	--	--	--	4/4	9.20E-01	9.20E-01	2.30E-01	2.30E-01	--	--	--	5.20E-01	--	--	--	NA	2/2	1.70E+00	1.70E+00	5.00E+00	2/2	1.70E+00	1.70E+00	5.00E+00	NO
Sodium	--	--	--	--	--	4/4	5.60E+03	5.60E+03	1.40E+03	1.40E+03	--	--	--	NA	5/8	6.80E+02	5.61E+02	NA	2/2	1.67E+05	1.67E+05	NA	2/2	1.65E+05	1.65E+05	NA	NO, essential nutrient
Vanadium	--	--	--	--	--	4/4	6.40E+00	6.40E+00	1.60E+00	1.60E+00	--	--	--	2.00E+00	8/8	2.57E+01	2.15E+01	NA	2/2	1.06E+01	1.06E+01	2.00E+01	2/2	9.40E+00	9.40E+00	2.00E+01	YES
Zinc	--	--	--	--	--	4/4	4.00E+02	4.00E+02	1.00E+02	1.00E+02	--	--	--	1.20E+02	8/8	6.20E+01	4.96E+01	1.21E+02	2/2	5.60E+00	5.60E+00	6.57E+01	2/2	1.40E+00	1.40E+00	6.57E+01	NO
PCBS																											
Aroclor-1254	7/7	2.64E-01	2.64E-01	6.60E-02	6.60E-02	11/12	4.40E+00	3.03E+00	1.10E+00	7.58E-01	--	--	--	4.00E+01	21/24	1.10E-01	5.10E-02	6.00E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES
Total PCB Congeners	2/2	6.40E-01	6.40E-01	1.60E-01	1.60E-01	3/3	2.04E+01	2.04E+01	5.10E+00	5.10E+00	--	--	--	4.00E+01	2/2	3.50E-02	3.50E-02	5.98E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC
Total PCB Aroclors	7/7	2.64E-01	2.64E-01	6.60E-02	6.60E-02	11/11	4.40E+00	2.80E+00	1.10E+00	6.99E-01	--	--	--	4.00E+01	21/24	1.10E-01	5.68E-02	5.98E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES
PESTICIDES																											
DDTr	--	--	--	--	--	4/4	7.68E-01	7.68E-01	1.92E-01	1.92E-01	--	--	--	NA	10/10	1.87E-02	1.20E-02	5.28E-03	1/1	7.40E-02	7.40E-02	NA	--	--	--	NA	YES
delta-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	1/10	9.80E-04	9.80E-04	3.00E-03	--	--	--	1.41E+02	--	--	--	1.41E+02	NO
Endrin	--	--	--	--	--	4/4	3.16E-01	3.16E-01	7.90E-02	7.90E-02	--	--	--	NA	1/10	1.50E-03	1.50E-03	2.22E-03	--	--	--	2.00E-03	--	--	--	2.00E-03	NO
gamma-Chlordane	--	--	--	--	--	4/4	1.00E-01	1.00E-01	2.50E-02	2.50E-02	--	--	--	NA	9/10	4.40E-03	2.42E-03	3.24E-03	--	--	--	4.00E-03	--	--	--	4.00E-03	YES
Heptachlor epoxide	--	--	--	--	--	4/4	1.08E-02	1.08E-02	2.70E-03	2.70E-03	--	--	--	NA	3/10	1.50E-03	1.50E-03	2.47E-03	--	--	--	3.80E-03	--	--	--	3.80E-03	NO

Note:
95UCLM: 95 percent upper confidence limit on the mean
--: No data available
COPC: Chemical of potential concern
Selection of Chemicals of Potential Concern: if an analyte exceeds the screening criteria in any media or no screening is available, the analyte is retained as a COPC

Selection of Chemicals of Potential Concern
for Exposure Area 5: Lined Canals, Reservoirs, and Soil

Analyte	Benthos Tissue			Fish Tissue					Surface Soil				Sediment				Surface Water (Total)				Surface Water (Dissolved)				Selection of Chemicals of Potential Concern	Selection of Chemicals of Potential Concern
	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Frequency	Maximum (mg/kg dry wt)	95UCLM (mg/kg dry wt)	Maximum (mg/kg wet wt)	95UCLM (mg/kg wet wt)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (mg/kg)	95UCLM (mg/kg)	Screening Criteria (mg/kg)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Frequency	Maximum (µg/L)	95UCLM (µg/L)	Screening Criteria (µg/L)	Terrestrial Habitats	Aquatic Habitats
Metals																										
Aluminum	--	--	--	2/2	1.56E+01	1.56E+01	3.90E+00	3.90E+00	58/58	2.77E+04	2.08E+04	3.00E+04	18/18	6.74E+04	2.67E+04	NA	11/12	1.86E+03	1.16E+03	8.70E+01	2/12	2.02E+03	2.02E+03	8.70E+01	NO	YES
Arsenic	--	--	--	--	--	--	--	--	58/58	7.60E+00	5.62E+00	1.80E+01	18/18	2.51E+01	7.65E+00	9.79E+00	12/12	4.90E+00	4.90E+00	1.50E+02	12/12	4.80E+00	4.50E+00	1.50E+02	NO	YES
Barium	--	--	--	2/2	2.76E+01	2.76E+01	6.90E+00	6.90E+00	58/58	3.59E+02	1.91E+02	3.30E+02	18/18	2.14E+02	1.77E+02	NA	12/12	1.54E+02	1.39E+02	1.60E+04	12/12	1.47E+02	1.27E+02	1.60E+04	YES	YES
Beryllium	--	--	--	--	--	--	--	--	58/58	1.20E+00	9.00E-01	1.00E+01	6/18	1.00E+00	8.95E-01	NA	--	--	--	5.30E+00	--	--	--	5.30E+00	NO	YES
Cadmium	--	--	--	1/2	8.00E-02	8.00E-02	2.00E-02	2.00E-02	30/58	6.40E-01	4.88E-01	3.20E+01	18/18	5.10E-01	4.25E-01	9.90E-01	--	--	--	1.50E-01	--	--	--	1.50E-01	NO	NO
Calcium	--	--	--	2/2	7.60E+04	7.60E+04	1.90E+04	1.90E+04	58/58	1.34E+05	1.01E+05	NA	18/18	2.11E+05	1.24E+05	NA	12/12	1.90E+05	1.06E+05	NA	12/12	9.58E+04	8.01E+04	NA	NO, essential nutrient	NO, essential nutrient
Chromium	--	--	--	2/2	1.04E+00	1.04E+00	2.60E-01	2.60E-01	58/58	1.61E+01	1.21E+01	4.00E-01	18/18	1.52E+01	1.21E+01	4.34E+01	4/12	7.60E-01	7.60E-01	4.20E+01	4/12	3.50E-01	3.47E-01	4.20E+01	YES	NO
Cobalt	--	--	--	1/2	2.84E-01	2.84E-01	7.10E-02	7.10E-02	58/58	7.40E+00	6.20E+00	1.30E+01	18/18	6.60E+00	5.73E+00	5.00E+01	--	--	--	1.50E+03	--	--	--	1.50E+03	NO	NO
Copper	--	--	--	2/2	3.80E+00	3.80E+00	9.50E-01	9.50E-01	58/58	1.88E+01	1.20E+01	7.00E+01	18/18	7.59E+03	4.62E+03	3.16E+01	12/12	2.64E+02	1.19E+02	5.24E+00	3/12	2.50E+02	2.50E+02	5.24E+00	NO	YES
Iron	--	--	--	2/2	9.60E+01	9.60E+01	2.40E+01	2.40E+01	58/58	6.02E+04	2.18E+04	1.50E+04	18/18	2.34E+04	1.92E+04	2.00E+04	11/12	1.55E+03	1.01E+03	1.00E+03	2/12	1.83E+03	1.83E+03	1.00E+03	NO, essential nutrient	NO, essential nutrient
Lead	--	--	--	2/2	2.80E-01	2.80E-01	7.00E-02	7.00E-02	58/58	7.42E+01	1.88E+01	1.20E+02	18/18	4.09E+01	1.84E+01	3.58E+01	10/12	2.00E+00	1.35E+00	1.17E+00	1/12	2.20E+00	2.20E+00	1.17E+00	NO	YES
Magnesium	--	--	--	2/2	2.16E+03	2.16E+03	5.40E+02	5.40E+02	58/58	1.04E+04	7.14E+03	NA	18/18	9.00E+03	7.13E+03	NA	12/12	5.63E+04	3.73E+04	3.24E+03	12/12	3.34E+04	3.19E+04	3.24E+03	NO, essential nutrient	NO, essential nutrient
Manganese	--	--	--	2/2	3.16E+01	3.16E+01	7.90E+00	7.90E+00	58/58	7.79E+02	3.96E+02	2.20E+02	18/18	5.09E+02	4.40E+02	4.60E+02	12/12	1.15E+02	8.82E+01	1.20E+02	6/12	1.31E+02	4.99E+01	1.20E+02	YES	YES
Mercury	--	--	--	2/2	3.60E-01	3.60E-01	9.00E-02	9.00E-02	57/58	9.40E-02	5.29E-02	1.00E-01	17/18	6.00E-02	4.33E-02	1.80E-01	--	--	--	1.30E+00	--	--	--	1.30E+00	NO	NO
Nickel	--	--	--	2/2	5.20E-01	5.20E-01	1.30E-01	1.30E-01	58/58	1.70E+01	1.33E+01	3.80E+01	18/18	1.45E+01	1.18E+01	2.27E+01	11/12	2.30E+00	1.79E+00	2.89E+01	7/12	2.30E+00	1.42E+00	2.89E+01	NO	NO
Potassium	--	--	--	2/2	1.04E+04	1.04E+04	2.60E+03	2.60E+03	58/58	6.27E+03	5.19E+03	NA	18/18	6.03E+03	4.70E+03	NA	12/12	1.22E+04	8.28E+03	NA	12/12	7.63E+03	7.14E+03	NA	NO, essential nutrient	NO, essential nutrient
Selenium	--	--	--	2/2	1.12E+00	1.12E+00	2.80E-01	2.80E-01	12/58	2.60E-01	1.46E-01	5.20E-01	13/18	4.80E-01	3.57E-01	NA	12/12	1.80E+00	1.22E+00	5.00E+00	7/12	1.50E+00	1.51E+00	5.00E+00	NO	YES
Sodium	--	--	--	2/2	4.40E+03	4.40E+03	1.10E+03	1.10E+03	35/58	1.79E+04	3.20E+03	NA	16/18	1.18E+03	8.44E+02	NA	12/12	3.34E+05	2.05E+05	NA	12/12	1.77E+05	1.67E+05	NA	NO, essential nutrient	NO, essential nutrient
Vanadium	--	--	--	2/2	2.12E+00	2.12E+00	5.30E-01	5.30E-01	58/58	3.14E+01	2.33E+01	2.00E+00	18/18	3.58E+01	2.47E+01	NA	12/12	1.05E+01	1.00E+01	2.00E+01	12/12	1.10E+01	9.16E+00	2.00E+01	YES	YES
Zinc	--	--	--	2/2	3.20E+02	3.20E+02	8.00E+01	8.00E+01	58/58	1.60E+02	6.03E+01	1.20E+02	18/18	6.95E+01	5.33E+01	1.21E+02	12/12	8.10E+00	5.43E+00	6.57E+01	8/12	1.61E+01	5.73E+00	6.57E+01	YES	NO
PCBS																										
Aroclor-1016	--	--	--	--	--	--	--	--	1/70	3.40E-03	3.40E-03	4.00E+01	--	--	--	7.00E-03	--	--	--	1.40E-02	--	--	--	1.40E-02	YES , main COPC	NO
Aroclor-1254	--	--	--	8/28	1.16E+00	4.80E-01	2.90E-01	1.20E-01	3/70	1.10E-02	1.10E-02	4.00E+01	15/33	2.30E-02	6.08E-03	6.00E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC	YES, main COPC
Aroclor-1260	--	--	--	--	--	--	--	--	27/70	1.00E-02	2.67E-03	4.00E+01	4/33	2.80E-03	2.20E-03	5.00E-03	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC	YES, main COPC
Total PCB Congeners	--	--	--	3/3	4.79E-01	4.79E-01	1.20E-01	1.20E-01	24/24	4.50E-02	1.02E-02	4.00E+01	10/10	2.10E-02	1.32E-02	5.98E-02	6/6	1.10E-02	1.10E-02	1.40E-02	--	--	--	1.40E-02	YES, main COPC	YES, main COPC
Total PCB Aroclors	--	--	--	8/8	1.16E+00	9.56E-01	2.90E-01	2.39E-01	28/28	1.76E-02	6.23E-03	4.00E+01	18/33	2.30E-02	1.33E-02	5.98E-02	--	--	--	1.40E-02	--	--	--	1.40E-02	YES, main COPC	YES, main COPC
PESTICIDES																										
DDTr	--	--	--	2/2	2.27E-01	2.27E-01	5.67E-02	5.67E-02	47/58	8.14E-02	2.10E-02	NA	16/19	9.67E-02	4.51E-02	5.28E-03	1/12	3.10E-02	3.10E-02	NA	--	--	--	NA	YES	YES
Aldrin	--	--	--	1/2	4.00E-04	4.00E-04	1.00E-04	1.00E-04	--	--	--	NA	1/19	6.50E-04	6.50E-04	2.00E-03	--	--	--	3.00E-01	--	--	--	3.00E-01	NO	NO
alpha-BHC	--	--	--	--	--	--	--	--	--	--	--	NA	2/19	6.70E-04	6.70E-04	6.00E-03	--	--	--	7.40E+01	--	--	--	7.40E+01	NO	NO
alpha-Chlordane	--	--	--	2/2	6.80E-03	6.80E-03	1.70E-03	1.70E-03	1/58	2.30E-03	2.30E-03	NA	3/19	1.30E-03	1.30E-03	3.24E-03	--	--	--	4.00E-03	--	--	--	4.00E-03	YES	NO
delta-BHC	--	--	--	--	--	--	--	--	--	--	--	NA	2/19	3.00E-03	3.00E-03	3.00E-03	1/12	2.80E-02	2.80E-02	1.41E+02	--	--	--	1.41E+02	NO	YES
Dieldrin	--	--	--	--	--	--	--	--	2/58	1.40E-02	1.40E-02	NA	1/19	7.50E-03	7.50E-03	1.90E-03	--	--	--	2.00E-03	--	--	--	2.00E-03	YES	YES
Endosulfan I	--	--	--	--	--	--	--	--	1/58	7.50E-04	7.50E-04	NA	--	--	--	NA	--	--	--	5.60E-02	--	--	--	5.60E-02	YES	NO
Endosulfan II	--	--	--	--	--	--	--	--	5/58	1.70E-02	2.36E-03	NA	2/19	6.00E-03	6.00E-03	NA	--	--	--	5.60E-02	--	--	--	5.60E-02	YES	YES
Endosulfan sulfate	--	--	--	2/2	2.12E-03	2.12E-03	5.30E-04	5.30E-04	2/58	1.30E-02	1.30E-02	NA	1/19	1.70E-03	1.70E-03	NA	--	--	--	5.60E-02	--	--	--	5.60E-02	YES	YES
Endrin	--	--	--	2/2	3.64E-02	3.64E-02	9.10E-03	9.10E-03	3/58	6.90E-03	6.90E-03	NA	1/19	1.30E-03	1.30E-03	2.22E-03	--	--	--	2.00E-03	--	--	--	2.00E-03	YES	NO
Endrin aldehyde	--	--	--	2/2	3.56E-03	3.56E-03	8.90E-04	8.90E-04	10/58	3.50E-02	4.14E-03	NA	3/19	5.60E-03	5.60E-03	NA	--	--	--	1.21E+03	--	--	--	1.21E+03	YES	YES
Endrin ketone	--	--	--	2/2	8.00E-03	8.00E-03	2.00E-03	2.00E-03	1/58	2.10E-03	2.10E-03	NA	1/19	2.10E-02	2.10E-02	NA	--	--	--	NA	--	--	--	NA	YES	YES
gamma-BHC (Lindane)	--	--	--	1/2	3.00E-04	3.00E-04	7.50E-05	7.50E-05	--	--	--	NA	1/19	9.40E-04	9.40E-04	2.37E-03	--	--	--	8.00E-02	--	--	--	8.00E-02	NO	NO
gamma-Chlordane	--	--	--	1/2	2.36E-02	2.36E-02	5.90E-03	5.90E-03	3/58	1.40E-03	1.40E-03	NA	7/19	2.90E-03	1.98E-03	3.24E-03	--	--	--	4.00E-03	--	--	--	4.00E-03	YES	NO
Heptachlor	--	--	--	--	--	--	--	--	--	--	--	NA	1/19	3.90E-03	3.90E-03	NA	--	--	--	4.00E-03	--	--	--	4.00E-03	NO	YES
Heptachlor epoxide	--	--	--	2/2	1.48E-03	1.48E-03	3.70E-04	3.70E-04	2/58	1.10E-03	1.10E-03	NA	6/19	1.80E-03	1.53E-03	2.47E-03	--	--	--	3.80E-03	--	--	--	3.80E-03	YES	NO
Methoxychlor	--	--	--	2/2	2.36E-02	2.36E-02	5.90E-03	5.90E-03	2/58	1.10E-02	1.10E-02	NA	1/19	3.00E-02	3.00E-02	NA	--	--	--	3.00E-02	--	--	--	3.00E-02	YES	NO
Toxaphene	--	--	--	--	--	--	--	--	2/58	5.60E-01	5.60E-01	NA	--	--	--	1.00E-04	--	--	--	2.00E-04	--	--	--	2.00E-04	YES	NO
PAHs																										
Total LMW PAHs	--	--	--	--	--	--	--	--	3/58	1.30E-01	1.30E-01	2.90E+01	2/19	2.77E+01	2.77E+01	5.52E-01	--	--	--	NA	--	--	--	NA	NO	YES
Total HMW PAHs	--	--	--	--	--	--	--	--	3/58	1.30E+00	1.30E+00	1.80E+01	3/19	2.38E+02	2.38E+02	1.70E+00	--	--	--	NA	--	--	--	NA	NO	YES
SVOCS																										
Benzaldehyde	--	--	--	2/2	2.48E-01	2.48E-01	6.20E-02	6.20E-02	--	--	--	NA	--	--	--	NA	1/12	2.00E+00	2.00E+00	NA	--	--	--	NA	NO	YES
Bis(2-ethylhexyl)phthalate	--	--	--	--	--	--	--	--	22/58	5.20E+00	4.75E-01	NA	5/19	8.10E+00	3.41E+00	1.80E-01	1/12	3.10E+00	3.10E+00	3.00E+02	--	--	--	3.00E+02	YES	YES
Butylbenzylphthalate	--	--	--	--	--	--	--	--	1/58	4.70E-01	4.70E-01	NA	1/19	9.90E-01	9.90E-01	NA	--	--	--	9.30E+01	--	--	--	9.30E+01	YES	YES
Caprolactam	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	NA	1/12	3.10E+00	3.10E+00	NA	--	--	--	NA	NO	YES
Carbazole	--	--	--	--	--	--	--	--	--	--	--	NA	1/19	2.40E+00	2.40E+00	NA	--	--	--	NA	--	--	--	NA	NO	YES
Dibenzofuran	--	--	--	--	--	--	--	--	--	--	--	NA	1/19	3.50E-01	3.50E-01	NA	--	--	--	9.40E+01	--	--	--	9.40E+01	NO	YES
Di-n-butyl phthalate	--	--	--	--	--	--	--	--	3/58	1.00E-01	1.00E-01	2.00E+02	--	--	--	NA	--	--	--	7.00E+00	--	--	--	7.00E+00	NO	NO
VOCS																										
Acetone	--	--	--	--	--	--	--	--	7/19	1.71E-02	1.35E-02	NA	--	--	--	6.00E+01	1/6	4.80E+00	4.80E+00	1.01E+05	--	--	--	1.01E+05	YES	NO
Bromodichloromethane	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	2.46E+00	1/6	3.40E+00	3.40E+00	2.16E+03	--	--	--	2.16E+03	NO	NO
Bromoform	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	NA	1/6	3.60E+00	3.60E+00	1.49E+02	--	--	--	1.49E+02	NO	NO
Chloroform	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	9.40E-01	1/6	2.10E+00	2.10E+00	8.90E+02	--	--	--	8.90E+02	NO	NO
Dibromochloromethane	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	1.60E-01	1/6	4.20E+00	4.20E+00	1.29E+02	--	--	--	1.29E+02	NO	NO
Methylene chloride	--	--	--	--	--	--	--	--	4/19	3.60E-03	3.52E-03	NA	--	--	--	7.75E+00	--	--	--	1.10E+04	--	--	--	1.10E+04	YES	NO
Toluene	--	--	--	--	--	--	--	--	--	--	--	2.00E+02	1/9	4.70E-03	4.70E-03	2.88E+00	--	--	--	1.45E+03	--	--	--	1.45E+03	NO	NO

Note:
95UCLM: 95 percent upper confidence limit on the mean
--: No data available
COPC: Chemical of potential concern
Selection of Chemicals of Potential Concern: if an analyte exceeds the screening criteria in any media or no screening is available, the analyte is retained as a COPC

Appendix C

Costs for Alternative 6, Replace Siphon and Dredging of Canal Sediment with Off-Site Disposal

TECHNOLOGY	LOCATION	MEDIUM	Estimated Cost to Implement	$8,100,000
Replace Siphon Alternative Component SI-B	Donna Reservoir and Canal System Donna, TX	Siphon	Construction Time: 4 months Operation Time: - years Post Remediation Monitoring: - years	

		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Material Unit Cost	Material Total Cost	Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$8,100,000**
Construction Activities											**$5,185,422**
Temporary Facilities and Site Maintenance											
Command facility 40' combo with 15' office	Mobile Mini, Inc.	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 506.00	$2,024
Office equipment rental average	0152 1340 0100	4	month	$ -	$ -	$ -	$ -	$ 219	$ 877	$ -	$877
Land lease	USDA	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 33.46	$134
Command facility mobilization/demobilization	Mobile Mini, Inc.	1	lump sum	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,914.00	$1,914
Clearing & grubbing, light trees, to 6" diameter	3111 1010 0020	1	acre	$ 2,206	$ 2,206	$ 1,807	$ 1,807	$ -	$ -	$ -	$4,013
Rough grade, 20,100-25,000 SF	3122 1320 0210	1	ea	$ 576	$ 576	$ 550	$ 550	$ -	$ -	$ -	$1,127
Temporary, roads, gravel fill, 4" gravel depth	0155 2350 0050	2,500	SY	$ 2	$ 5,228	$ 1	$ 1,385	$ 4	$ 10,145	$ -	$16,757
Fencing	United Site Services	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 550.00	$2,200
Generator	United Rentals	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,922.60	$15,690
Lighting	United Rentals	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,663.20	$6,653
Toilet, portable chemical (2 toilets)	0154 3340 6410	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 427.90	$1,712
Rubbish handling, dumpster, 10 CY, 3 ton capacity, one dump per week	0241 1919 0700	16	weeks	$ -	$ -	$ -	$ -	$ 511	$ 8,180	$ -	$8,180
Site security (24 hours a day) (2 guards)	0156 3250 0100	5,760	hr	$ 49.58	$ 285,565	$ -	$ -	$ -	$ -	$ -	$285,565
Excavation, Installation and Backfill											
Pre- and post-construction topographical survey	0221 1309 0100	3.67	acre	$ 4,240	$ 15,575	$ 158	$ 579	$ 132	$ 483	$ -	$16,636
Per diem	GSA + Tax	84	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,992.00	$167,328
Clearing brush by hand	3113 1310 0100	1.84	acre	$ 2,857	$ 5,246	$ -	$ -	$ -	$ -	$ -	$5,246
Erosion control, silt fence, install and maintain, remove, 3' high	3125 1416 1000	5,000	LF	$ 1	$ 4,351	$ 0.14	$ 692	$ 1	$ 2,982	$ -	$8,026
Rent and operate water truck, off highway, 6,000 gallon capacity	0154 3340 6950	12	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,630.10	$115,561
108" diameter pipe, prestressed concrete	Layne Christensen Company	1,600	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ 770.00	$1,232,000
Excavation, installation, backfill, compaction labor	Layne Christensen Company	1,600	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ 220.00	$352,000
Engineering oversight	Professional est	84	day	$ 768	$ 64,512	$ -	$ -	$ -	$ -	$ -	$64,512
Bypass Arroyo Colorado											
Per diem	GSA + Tax	21	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,992.00	$41,832
Cofferdam including mobilization and temporary sheeting, shore driven	3152 1610 0020/professional estimate	6,000	SF	$ 7	$ 44,732	$ 9	$ 51,378	$ 36.042	$ 216,250	$ -	$312,360
Dewatering systems, drainage trench 2' wide, 3' deep with backhoe loader	3123 1920 0100	140	CY	$ 6	$ 831	$ 3	$ 410	$ -	$ -	$ -	$1,241
Pumping 8 hr., 20 LF suction 100 LF discharge, 6 inch centrifugal (2 pump)	3123 1920 1100	21	day	$ 633	$ 13,289	$ 767	$ 16,101	$ -	$ -	$ -	$29,390
Excavating bypass, 1 CY hydraulic excavator	3123 1613 0120	2,400	BCY	$ 2	$ 4,894	$ 2	$ 5,266	$ -	$ -	$ -	$10,160
Silt curtain (100'x7')	Granite Environmental, Inc	3	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,427.69	$7,283
Sampling analysis - PCB as Aroclors	TestAmerica, Inc.	20	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 180.40	$3,608
Sampling equipment and supplies	Professional est.	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,200.00	$2,200
Backfill, 2-1/2 CY front end loader, 300' haul	3123 2317 0190	3,000	LCY	$ 1	$ 3,156	$ 3	$ 10,193	$ -	$ -	$ -	$13,349
Rough grade 75,100-100,000 SF	3122 1320 0280	1	ea	$ 2,232	$ 2,232	$ 2,131	$ 2,131	$ -	$ -	$ -	$4,363
Modified Canal Segments											
Per diem	GSA + Tax	35	days	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,490.00	$87,150
Rough grade 75,100-100,000 SF	3122 1320 0280	2	ea	$ 2,232	$ 4,464	$ 2,131	$ 4,262	$ -	$ -	$ -	$8,725
Excavation, hydraulic, crawler mtd, 1-1/2 CY	3123 1642 0250	5,000	BCY	$ 0.82	$ 4,091	$ 1.11	$ 5,538	$ -	$ -	$ -	$9,630
Selective demolition, concrete	0305 0510 0050	800	CY	$ 49.54	$ 39,631	$ 10.30	$ 8,239	$ -	$ -	$ -	$47,870
Cast-in place retaining walls, w/ vertical face, 33 deg embankment, 10' high	3232 1310 2600	600	LF	$ 569.52	$ 341,712	$ 73.36	$ 44,017	$ 402	$ 241,491	$ -	$627,221
Slip form concrete canal lining, unreinforced, 8"thick	3213 1328 0120	3,667	SY	$ 0.78	$ 2,857	$ 0.87	$ 3,202	$ 37	$ 137,229	$ -	$143,289
Cofferdam at siphon entrance and exit	Lincoln Park FS[5]	100	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ 325.23	$32,523
Bypass pumps, 375 HP diesel, (6 pumps)	Baker Corp/0131 1320 0160	2	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 49,055.60	$98,111
Pump fuel costs	Baker Corp	14	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,603.20	$106,445
Knife Gate, handwheel operator, 20" diameter	3520 1669 0170	6	ea	$ 396.79	$ 2,381	$ 388.41	$ 2,330	$ 13,371	$ 80,223	$ -	$84,934
Prestressed concrete pipe, 150 PSI, 12" diameter	3311 1310 3000	600	LF	$ 8.65	$ 5,190	$ 4.21	$ 2,524	$ 64	$ 38,508	$ -	$46,223
Weir replacement (flow control gate)	Layne Christensen Company	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 385,000.00	$385,000

TECHNOLOGY	LOCATION	MEDIUM	Estimated Cost to Implement	$8,100,000
Replace Siphon Alternative Component SI-B	Donna Reservoir and Canal System Donna, TX	Siphon	Construction Time: 4 months Operation Time: - years Post Remediation Monitoring - years	

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantity Unit	Cost Breakdown (if available): Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Material Unit Cost	Material Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
Existing Siphon Sealing											
Total cost to complete	Inquip Associates, Inc	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 770,000.00	$770,000
Site Restoration											
Rough grade 75,100-100,000 SF	3122 1320 0280	1	ea	$ 2,232	$ 2,232	$ 2,131	$ 2,131	$ -	$ -	$ -	$4,363
Seeding, hydro or air seeding, with mulch and fertilizer	3292 1914 5400	300	MSF	$ 15	$ 4,368	$ 9	$ 2,799	$ 44	$ 13,135	$ -	$20,302
Mobilization and Demobilization											**$259,053**
5% of Total Costs of Site Work										$5,181,060	$259,053
System Contingency											**$1,360,028**
25% of Total Construction Activities										$5,440,113	$1,360,028
Professional/Technical Services[3]											**$1,292,027**
5% of Construction + Contingency for Project Management										$ 6,800,141	$340,007
8% of Construction + Contingency for Remedial Design										$ 6,800,141	$544,011
6% of Construction + Contingency for Construction Management										$ 6,800,141	$408,008

OPERATION AND MAINTENANCE — ANNUAL O&M COST $ -; LIFETIME O&M (NPV) $ -

NO LONG TERM O&M REQUIRED

LONG TERM MONITORING — ANNUAL LTM COST $ -; LIFETIME LTM (NPV) $ -

NO LONG TERM MONITORING REQUIRED

TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring) $8,100,000

Assumptions:

General

Working condition is Safety Level:	D	(Labor productivity:	82%	;	Equipment productivity	100%	)
Weighted Average of city cost index	96.8%	(not applicable for costs derived from vendor quotes).					
Costs are loaded with mark-up	10%						
Inflation	3%	per year	6%	for 2 years	13%	for 4 years	34% for 10 years
Sales Tax	8.25%						

During Excavation and Backfill

Density of Soil	1.6	ton/CY			
Workers work week consists of	6	days /week	1	rigs	
Loose cubic yard to in-place cubic yard ratio	1.25	LCY/BCY			
	1	mobilization/demobilizations per excavator			$664 per diem per rig

During Cap Installation

Workers work week consists of	6	days /week	1	rigs	
	1	mobilization/demobilizations per excavator			$664 per diem per rig

Approximate hourly wage

Standard work day	12	hrs
Approximate hourly wage (Field Engineer)	$100.00	

Notes

BCY	In-place cubic yard	gal	Gallon	LF	Linear foot
CY	Cubic yard	hrs	Hours	MSF	thousand square feet
ea	Each	HP	horse power	O&M	Operation and maintenance
ECY	Embankment cubic yards	H&S	Health and Safety	SF	Square foot
ft	Foot	LCY	Loose cubic yard	SY	Square yard

1 Source is The Gordian Group, RS Means Online (2016), McAllen, TX, unless otherwise cited
2 Source: "Lincoln Park/Milwaukee River Channel Sediments Site, Phase II Feasibility Study/Remedial Design", EA Engineering (2013)
3 Source of factor: "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," US EPA (July 2000)

TECHNOLOGY	LOCATION	MEDIUM	Estimated Cost to Implement	$11,300,000
Dredging of Canal Sediment with Off-Site Disposal Alternative Component SE-A	Donna Reservoir and Canal System Donna, TX	Sediment	Construction Time:	5 months
			Operation Time:	5 years
			Post Remediation Monitoring	20 years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Material Unit Cost	Material Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION - CONSTRUCTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$7,580,000**
Construction Activities											**$5,332,903**
Temporary Facilities and Site Maintenance											
Command facility 40' combo with 15' office	Mobile Mini, Inc.	5	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 506.00	$2,530
Office equipment rental average	0152 1340 0100	5	month	$ -	$ -	$ -	$ -	$ 219	$ 1,096	$ -	$1,096
Land lease	USDA	5	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 33.46	$167
Clearing & grubbing, heavy trees, to 12" diameter	3111 1010 0200	1	acre	$ 3,139	$ 3,139	$ 2,589	$ 2,589	$ -	$ -	$ -	$5,729
Rough grade 35,100-40,000 SF	3122 1320 0240	1	ea	$ 893	$ 893	$ 858	$ 858	$ -	$ -	$ -	$1,750
Temporary, roads, gravel fill, 4" gravel depth	0155 2350 0050	4,000	SY	$ 2	$ 8,365	$ 1	$ 2,215	$ 4	$ 16,231	$ -	$26,811
Fencing	United Site Services	5	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 687.50	$3,438
Generator	United Rentals	5	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,922.60	$19,613
Lighting	United Rentals	5	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,663.20	$8,316
Toilet, portable chemical (2 toilets)	0154 3340 6410	5	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 427.90	$2,140
Rubbish handling, dumpster, 10 CY, 3 ton capacity, one dump per week	0241 1919 0700	21	weeks	$ -	$ -	$ -	$ -	$ 511	$ 10,736	$ -	$10,736
Temporary bridge rental	Mabey	21	weeks	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,034	$21,714
Concrete caissons for marine const., 80 to 150 ton capacity, 22" diameter, 10' deep	3163 2616 0400	120	VLF	$ 63	$ 7,561	$ 26	$ 3,166	$ 27	$ 3,288	$ -	$14,015
Temporary bridge installation	0131 1320 0160	1	week	$ 11,884	$ 11,884	$ -	$ -	$ -	$ -	$ -	$11,884
Gravel for road maintenance, 3" thick	Stone and Soil, Inc	134,580	SF	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.41	$54,829
Gravel freight	Stone and Soil, Inc	62	load	$ -	$ -	$ -	$ -	$ -	$ -	$ 220.00	$13,713
Excavator diesel hydraulic crawler mounted 1-1/2 CY capacity	0154 3320 0200	6	week	$ 4,066	$ 24,396	$ 3,110	$ 18,657	$ -	$ -	$ -	$43,053
Site security (24 hours a day) (2 guards)	0156 3250 0100	7,200	hr	$ 49.58	$ 356,956	$ -	$ -	$ -	$ -	$ -	$356,956
Excavation											
Per diem construction crew	GSA + Tax	100	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,328.00	$132,800
Clearing brush by hand	3113 1310 0100	3	acre	$ 2,857	$ 8,825	$ -	$ -	$ -	$ -	$ -	$8,825
Excavating, clamshell, 1 CY; for wet excavation	3123 1642 0550; 3123 1642 4200	19,979	BCY	$ 2.91	$ 58,128	$ 4.78	$ 95,543	$ -	$ -	$ -	$153,672
Excavator attachment, grapple	0154 3320 0345	15	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 646.29	$9,694
Front end loader, 4WD, 2.5-3.5 CY 145HP	0154 3320 4710/0131 1320 0160	15	week	$ 1,981	$ 29,711	$ -	$ -	$ -	$ -	$ 1,392.88	$50,604
Rent truck, dump, 4 axle, 25 ton payload	0154 3320 5310/0131 1320 0160	15	week	$ 1,981	$ 29,711	$ -	$ -	$ -	$ -	$ 1,654.74	$54,532
Silt curtain (100' x 7')	Granite Environmental, Inc.	20	each	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,427.69	$48,554
Levee stabilization, loading and spreading, common earth, shovel, 1-1/2 CY bucket	3123 2315 4010	554	BCY	$ 0.71	$ 396	$ 1.27	$ 702	$ 39	$ 21,783	$ -	$22,881
Rent and operate water truck, off highway, 6,000 gallon capacity	0154 3340 6950	15	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,630.10	$144,452
Engineering oversight	Professional est	50	day	$ 1,200	$ 60,000	$ -	$ -	$ -	$ -	$ -	$60,000
Disposal of Sediment											
Mobilization/demobilization of water tight boxes	USA Environmental, LP	20	load	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,100.00	$22,000
Per diem truck drivers	GSA + Tax	79	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,660.00	$130,590
Transportation of sediment	USA Environmental, LP	1,573	load	$ -	$ -	$ -	$ -	$ -	$ -	$ 550.00	$865,354
Liners	USA Environmental, LP	1,573	load	$ -	$ -	$ -	$ -	$ -	$ -	$ 33.00	$51,921
Box rental, 20 boxes	USA Environmental, LP	2,000	box days	$ -	$ -	$ -	$ -	$ -	$ -	$ 13.20	$26,400
Disposal of sediment, includes stabilization	USA Environmental, LP	28,321	ton	$ -	$ -	$ -	$ -	$ -	$ -	$ 77.00	$2,180,692
Washout of boxes	USA Environmental, LP	20	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 234.03	$4,681
Fractionation tank, 20,000 gallon capacity; for sediment dewatering	Baker Corp, Inc.	100	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 46.20	$4,620
Trash pump, for sediment dewatering	Sunbelt Rentals/0131 1320 0160	4	month	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,067.00	$4,268
Excavator diesel hydraulic crawler mounted, 1-1/2 CY	0154 3320 0200/0131 1320 0160	4	month	$ 7,923	$ 31,692	$ -	$ -	$ -	$ -	$ 9,248.69	$68,687
Cement, Portland, type I/II, trucked in bulk, 94 lb bags	0305 1330 0250	42,180	ea	$ -	$ -	$ -	$ -	$ 14	$ 596,589	$ -	$596,589
Confirmation Sampling											
Per diem	GSA + Tax	5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 498.00	$2,490
Forklift variable reach, 6,000 lbs	United Rentals	1	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,989.90	$1,990
17' Tracker boat with 40hp motor and trailer	Professional est	1	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200	$1,200

TECHNOLOGY	LOCATION	MEDIUM	Estimated Cost to Implement	$11,300,000
Dredging of Canal Sediment with Off-Site Disposal Alternative Component SE-A	Donna Reservoir and Canal System Donna, TX	Sediment	Construction Time:	5 months
			Operation Time:	5 years
			Post Remediation Monitoring	20 years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Material Unit Cost	Material Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
Sampling labor (3 samplers)	Professional est	5	day	$ 3,000	$ 15,000	$ -	$ -	$ -	$ -	$ -	$15,000
Sampling equipment, supplies, and shipping	Professional est	1	each	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,720	$5,720
Sediment analysis - PCBs as Aroclors	TestAmerica Inc.	50	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 180	$9,020
Reporting	Professional est	40	hr	$100	$ 4,000	$ -	$ -	$ -	$ -	$ -	$4,000
Engineering Controls											
Sign, aluminum, reflectorized, 30" by 30" and 10' steel posts, upright, bolted	1014 5320 0300/1014 5320 1500	20	ea	$ 28	$ 561	$ 16	$ 315	$ 170.91	$ 3,418	$ -	$4,295
Site Restoration											
Rip-rap & rock lining	3137 1310 0200	415	SY	$ 49	$ 20,402	$ 15	$ 6,334	$ 46	$ 18,997	$ -	$45,733
Rough grade 50,100-75,000 SF	3122 1320 0270	1	ea	$ 1,610	$ 1,610	$ 1,537	$ 1,537	$ -	$ -	$ -	$3,148
Mobilization and Demobilization											**$266,645**
5% of Total Costs of Site Work										$5,332,903	$266,645
System Contingency											**$1,399,100**
25% of Total Construction Activities										$5,596,400	$1,399,100
Professional/Technical Services[2]											**$577,325**
5% of Construction (not including disposal) + Contingency for Project Management										$ 3,038,551	$151,928
8% of Construction (not including disposal) + Contingency for Remedial Design										$ 3,038,551	$243,084
6% of Construction (not including disposal) + Contingency for Construction Management										$ 3,038,551	$182,313
REMEDIAL ACTION - FISH REMOVAL									**ANNUAL COST**		**$ 733,000**
									TOTAL COST (NPV)		**$ 3,010,000**
Residual Contamination Removal											**$558,391**
Annual Electrofishing and Fish Removal (for 5 years)											
Mobilization/demobilization	Professional est	2	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,730.00	$9,460
Per diem	GSA + Tax	35	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 830.00	$29,050
Forklift variable reach, 6,000 lbs	United Rentals	2	months	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,828.58	$9,657
17' Tracker boat with 40hp motor and trailer	EA Engineering	35	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 230	$8,050
Regular DC shocker for electrofishing	EA Engineering	35	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 260	$9,100
Removal activities (5 person team)	Professional est	35	day	$ 6,000	$ 210,000	$ -	$ -	$ -	$ -	$ -	$210,000
55 gallon steel drums	Dallas Steel Drums, Inc.	500	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 54	$27,088
Hazardous waste transportation to disposal site	0281 2010 1260	500	mile	$ -	$ -	$ -	$ -	$ -	$ -	$ 47	$23,408
Hazardous waste pickup and disposal	0281 2010 1100	500	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 221	$110,748
Low Water Removal Actions (for 5 years)											
Mobilization/demobilization	Professional est	2	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,730.00	$9,460
Per diem	GSA + Tax	10	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 664.00	$6,640
Forklift variable reach, 6,000 lbs	United Rentals	2	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,989.90	$3,980
17' Tracker boat with 40hp motor and trailer	EA Engineering	10	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 230	$2,300
Cast Net	Bett's Super Pro Cast Net	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 264.00	$264
Seine Netting (43 lb test)	The Fish Net Company	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 211	$211
Removal activities (4 person team)	Professional est	10	day	$ 4,800	$ 48,000	$ -	$ -	$ -	$ -	$ -	$48,000
55 gallon steel drums	Dallas Steel Drums, Inc.	100	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 54	$5,418
Hazardous waste transportation to disposal site	0281 2010 1260	500	mile	$ -	$ -	$ -	$ -	$ -	$ -	$ 47	$23,408
Hazardous waste pickup and disposal	0281 2010 1100	100	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 221	$22,150
System Contingency											**$139,598**
25% of Remedial Action - Fish Removals										$558,391	$139,597.76

TECHNOLOGY	LOCATION	MEDIUM	Estimated Cost to Implement	$11,300,000
Dredging of Canal Sediment with Off-Site Disposal Alternative Component SE-A	Donna Reservoir and Canal System Donna, TX	Sediment	Construction Time:	5 months
			Operation Time:	5 years
			Post Remediation Monitoring	20 years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Material Unit Cost	Material Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
Professional/Technical Services[2]											**$34,899**
5% of Remedial Action - Fish Removals + Contingency for Project Management										$ 697,989	$ 34,899
Lifetime Remedial Action - Fish Removals (Net Present Value)[2]											**$ 3,005,445**
Annual Remedial Action - Fish Removals Net Present Value											$ 3,005,445
5 Years of Operation											
7% Discount Factor (per EPA guidance)											
LONG TERM MONITORING, COMMUNITY INVOLVEMENT AND ENGINEERING CONTROLS									**ANNUAL LTM COST**		**$88,000**
									LIFETIME LTM (NPV)		**$700,000**
Monitoring, Sampling, Testing and Analysis - Fish											**$73,270**
Post Remediation Site Monitoring - Fish Tissue Sampling (at years 1, 2, 3, 4, 5, 7, and 9)											
Mobilization/demobilization	Professional est	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,360.00	$8,360
Per diem	GSA + Tax	5	days	$ -	$ -	$ -	$ -	$ -	$ -	$ 664.00	$3,320
Forklift variable reach, 6,000 lbs	United Rentals	1	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,989.90	$1,990
17' Tracker boat with 40hp motor and trailer	EA Engineering	5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 255.96	$1,280
Regular DC shocker for electrofishing	EA Engineering	5	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 255.96	$1,280
Sampling labor (4 samplers)	Professional est	5	day	$ 4,800	$ 24,000	$ -	$ -	$ -	$ -	$ -	$24,000
Sampling equipment, supplies, and shipping	Professional est	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,500.00	$5,500
Fish tissue analysis - PCBs as Aroclors	Test America Laboratories	100	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 235.40	$23,540
Reporting	Professional est	40	hr	$ 100	$ 4,000	$ -	$ -	$ -	$ -	$ -	$4,000
Monitoring, Sampling, Testing and Analysis - Sediment											**$189,039**
Post Remediation Site Monitoring - Sediment Sampling (at year 4)											
Mobilization/demobilization	Professional est	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,360.00	$8,360
Per diem	GSA + Tax	10	days	$ -	$ -	$ -	$ -	$ -	$ -	$ 664.00	$6,640
Forklift variable reach, 6,000 lbs	United Rentals	2	week	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,989.90	$3,980
17' Tracker boat with 40hp motor and trailer	EA Engineering	10	day	$ -	$ -	$ -	$ -	$ -	$ -	$ 255.96	$2,560
Sampling labor (4 samplers)	Professional est	10	day	$ 4,800	$ 48,000	$ -	$ -	$ -	$ -	$ -	$48,000
Sampling equipment, supplies, and shipping	Professional est	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,500.00	$5,500
Sediment analysis - PCB Congeners	Test America Laboratories	100	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,100.00	$110,000
Reporting	Professional est	40	hr	$ 100	$ 4,000	$ -	$ -	$ -	$ -	$ -	$4,000
Community Involvement											**$9,846**
Mobilization/demobilization	Professional est	1	events	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,650.00	$1,650
Per diem	GSA + Tax	6	days	$ -	$ -	$ -	$ -	$ -	$ -	$ 166.00	$996
Community outreach event (2 representatives)	Professional est	1	events	$ 7,200	$ 7,200	$ -	$ -	$ -	$ -	$ -	$7,200
Engineering Controls											**$1,074**
Sign Replacement	1014 5320 0300/1014 5320 1500	5	ea	$ 28	$ 140	$ 16	$ 79	$ 170.91	$ 855	$ -	$1,074
Professional/Technical Services[2]											**$4,209**
5% of Total Sampling Activities for Project Management										$84,189	$4,209
Lifetime Long Term Monitoring (Net Present Value)[2]											**$698,868**
Monitoring, Sampling, Testing and Analysis - Fish		1	NPV							$405,197	$405,197
Monitoring, Sampling, Testing and Analysis - Sediment		1	NPV							$151,428	$151,428
Community Involvement		1	NPV							$134,325	$134,325
Engineering Controls		1	NPV							$7,918	$7,918
10 Long-Term Sampling											

TECHNOLOGY	LOCATION	MEDIUM	Estimated Cost to Implement	$11,300,000
Dredging of Canal Sediment with Off-Site Disposal Alternative Component SE-A	Donna Reservoir and Canal System Donna, TX	Sediment	Construction Time:	5 months
			Operation Time:	5 years
			Post Remediation Monitoring	20 years

			Quantities		Cost Breakdown (if available)						Combined Unit Costs	
	Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Material Unit Cost	Material Total Cost	Unit Cost	Option Total Cost
10	Community Involvement and Engineering Controls											
7%	Discount Factor (per EPA guidance)											

TOTAL ESTIMATED NPV TECHNOLOGY COST **$11,300,000**

Assumptions:

General

Working condition is Safety Level:	D	Labor productivity:	82%	,	Equipment productivity:	100%		
Weighted Average of city cost index	96.8%	(not applicable for costs derived from vendor quotes).						
Costs are loaded with mark-up	10%							
Inflation	3%	per year	6%	for 2 years	13%	for 4 years	34%	for 10 years
Sales Tax	8.25%							

During Excavation

Density of Sediment	1.4	ton/CY			
Workers work week consists of	6	days /week	1	rigs	
	1	mobilization/demobilizations per excavator			$664 per diem per rig
Length of canal segment for excavation	4,486	feet			
Approximate width of canal	55.5	feet			
Approximate depth of excavation	2.17	feet			

Disposal

Approximate quantity of concrete for stabilization	7%	by weight
Disposal rate	20	loads/day

Annual Fish Sampling

Sampling to be conducted		1	time per year
Fish Tissue Samples		35	sample
Quality Control Samples		2	# of MS/MSDs to collect
Duplicate		3	# of duplicates to collect
Long Term Monitoring Reports		40	hours per report (1 report per event)
Standard work day		12	hrs
Approximate hourly wage	Junior Engineer	$100.00	
	Construction Manager	$140.00	
	Community Outreach Representative	$120.00	

Lab Costs

Sediment	
PCB Congeners	$1,000.00
Fish Tissue[3]	
PCB as Aroclors	$214.00

Notes

BCY	In-place cubic yard	H&S	Health and Safety
CY	Cubic yard	LCY	Loose cubic yard
ea	Each	LF	Linear foot
ft	Foot	SF	Square foot
gal	Gallon	SY	Square yard
hrs	Hours	VLF	Vertical linear foot
HP	horse power		

1 Source is The Gordian Group, RS Means Online (2016), McAllen, TX, unless otherwise cited
2 Source of factor: "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," US EPA (July 2000a)
3 Fish tissue analyses include cost for lipids and filleting

Appendix D

Determination of Applicable or Relevant and Appropriate Requirements and To-Be-Considered

APPENDIX D
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED

ARAR or TBC	Citation (If Available)	Description	Applicability
Chemical Specific			
None			
Location Specific			
National Historical Preservation Act	16 U.S.C. § 470 et. seq.; 36 C.F.R. Parts 63, 65, and 800	Establishes procedures to preserve scientific, historical, and archeological data from potential destruction resulting from a change in the site terrain resulting from a federal construction project or federally licensed activity.	Applicable if scientific, historical, and archeological data is discovered during the project.
National Flood Insurance Program	42 U.S.C. § 4101 et. seq;. 44 C.F.R Part 60	Prohibits alteration to river or floodplains that may increase potential for flooding.	Applicable because the site lies within a 100-year floodplain.
Executive Order 11988 Floodplains Management	42 Fed. Reg. 26951 (May 24, 1977)	Requires federal agencies to evaluate the potential affects of actions they may take in a floodplain to avoid adverse impacts in a floodplain.	Applicable because the site lies within a 100-year floodplain.
Endangered Species Act of 1973	16 U.S.C. §§ 1531, 1532, 1533, 1535, 1536; 50 C.F.R. Part 17	Federal agencies must confirm any action that is federally authorized, funded, or implemented by the agency is not probable to adversely affect the continued existence of any threatened or endangered species. There is uncertainty regarding whether threatened and endangered species are located at the Site.	Applicable if threatened or endangered species are found onsite.
Texas Administrative Code, Title 31 Natural Resources and Conservation, Part 2 Texas Parks and Wildlife Department, Chapter 65 Wildlife	31 Texas Admin. Code § 65.171-176	No person may take, possess, propogate, transport, sell or offer for sale, or ship any species of fish or wildlife listed as threatened or endangered. There is uncertainty regarding whether threatened and endangered species are located at the Site. The ERA assumed that any threatened or endangered species that could occur within Hidalgo County may be present at the Site.	Applicable if threatened or endangered species are found onsite.
Migratory Bird Treaty Act	16 U.S.C. §§ 703-712	Establishes federal responsibility for the protection of international migratory bird resources and requires continued consultation with the U.S. Fish and Wildlife Service during remedial design and remedial action activities to ensure that the cleanup of the site does not unnecessarily impact migratory birds.	Applicable if the remedy may impact migratory birds.

APPENDIX D
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED

ARAR or TBC	Citation (If Available)	Description	Applicability
Action Specific			
Disposal			
Resource Conservation and Recovery Act (RCRA) Subchapter III: Hazardous Waste Management	42 U.S.C. §§ 6921 et. seq.; 40 C.F.R. Part 262	RCRA Subchapter III C and its implementing regulations regulate the management of hazardous wastes. 40 C.F.R. Part 262 regulates generators of hazardous wastes.	Applicable if waste materials generated during remedial activities contain RCRA listed hazardous wastes or exhibit a hazardous waste characteristic.
Texas Administrative Code, Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 335 Industrial Solid Waste and Municipal Hazardous Waste	30 Tex. Admin. Code Chapter 335	Standards for industrial solid waste and municipal hazardous waste depending on classification as hazardous, Class 1, Class 2, or Class 3 waste. 30 Tex. Admin. Code 335.508(5) states that media contaminated by a material containing greater than or equal to 50 ppm total PCBs and wastes containing greater than or equal to 50 ppm PCBs shall be classified as Class 1 waste.	Applicable if hazardous, Class 1, Class 2 or Class 3 waste is generated during remedial activities.
Toxic Substances Control Act PCB Regulations	15 U.S.C. § 2601 et. seq.; 40 C.F.R. Part 761	The Toxic Substances Control Act (TSCA) PCB regulations regulate PCBs from their manufacture to disposal.	Applicable if PCB remediation waste is generated during remedial activities.
Hazardous Materials Transportation Act	49 U.S.C. §§ 5101 et. seq.; 49 C.F.R. Parts 171-180	Standards for packaging, documenting and transporting hazardous materials.	Applicable if hazardous materials are transported off-site for treatment or disposal.
Remediation Activities			
Texas Administrative Code, Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 327 Spill Prevention and Control	30 Texas Admin. Code Chapter 327	Chapter 327 of Title 30 of the Texas Administrative Code defines reportable quantities, notification requirements, and actions required in the event of a spill or release to the environment of oil, petroleum product, used oil, hazardous substances, industrial solid waste or other substances.	Applicable if a release or spill to the environment occurs during remedial activities.
Clean Water Act Section 401: Certification	33 U.S.C. § 1341	Requires applicants for NPDES permits to obtain certification from state or regional regulatory agencies that the proposed discharge will comply with CWA Sections 301, 302, 303, 306 and 307. On-site discharges would not require a NPDES permit, but would require compliance with substantive requirements. For off-site actions, certification should occur as part of the state identification of substantive state ARARs (USEPA 1998).	Applicable if remedial activities result in a discharge of a pollutant to navigable waters of the United States.
Clean Water Act Section 402: National Pollutant Discharge Elimination System	33 U.S.C. § 1342; 40 C.F.R. Part 125	Both on-site and off-site discharges of pollutants from CERCLA sites to navigable waters of the United States are required to meet the substantive requirements of the Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) (USEPA 1988). On-site discharges must comply with the substantive technical requirements of the CWA but do not require a permit. Off-site discharges would be regulated under the conditions of a NPDES permit. In Texas, the NPDES program is administered by TCEQ--see Texas Water Code, Title 2 Water Administration, Chapter 26 Water Quality Control.	Applicable if remedial activities result in a discharge of a pollutant to navigable waters of the United States.

APPENDIX D
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED

ARAR or TBC	Citation (If Available)	Description	Applicability
Clean Water Act Section 404: Permits for dredged or fill material	33 U.S.C. § 1344	Section 404 of the Clean Water Act applies to dredging, in-water disposal, capping, construction of berms or levees, stream chanelization, excavation and/or dewatering in navigable waters of the United States.	Applicable if remedial activities result in a discharge of a pollutant to navigable waters of the United States.
Texas Administrative Code, Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 279 Water Quality Certification	30 Texas Admin. Code Chapter 279	Establishes procedures and criteria for applying for, processing and reviewing state certifications under CWA Section 401.	Applicable if remedial activities result in a discharge of a pollutant to navigable waters of the United States.
Clean Water Act Sections 303 and 304: Federal Water Quality Criteria	33 U.S.C. § 1313-14	Under §303 (33 U.S.C. §1313), individual states have established water quality standards to protect existing and attainable uses of surface water.	Applicable if remedial activities result in a discharge of a pollutant to navigable waters of the United States.
Texas Water Code, Title 2 Water Administration, Chapter 26 Water Quality Control	Tex. Water Code § 26.121	Prohibits any discharge of pollutants into or adjacent to waters in the state except as authorized by TCEQ. TCEQ is delegated the authority to issue permits for the discharge of pollutants to the same extent as the NPDES permit program administered by the EPA under CWA Section 402. On-site discharges must comply with the substnative requirements of the CWA but do not require a permit. Off-site discharges would be regulated under the conditions of a TPDES permit. Direct discharges must meet technology-based requirements.	Applicable if remedial activities result in a discharge of a pollutant to navigable waters of the United States.

APPENDIX D
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED

ARAR or TBC	Citation (If Available)	Description	Applicability
Texas Administrative Code, Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 307 Texas Surface Water Quality Standards	30 Tex. Admin. Code Chapter 307	Sets forth criteria for surface water in Texas.	Applicable if remedial activities occur in the Arroyo Colorado River.
Rivers and Harbors Act of 1899: Obstruction of navigable waters (generally, wharves; piers, etc.); excavation and fill	33 U.S.C. § 401	Controls the alteration of navigable waters, including construction of structures such as piers, berms and installation of pilings as well as excavation and fill. No permit is required for on-site activities, but in-water construction activities must comply with the substantive requirements of the Act.	Applicable if remedial activities require construction in navigable waters of the United States.
Fish and Wildlife Coordination Act	16 U.S.C. § 662 et. seq.	When modifications to a stream or other water body are proposed or approved by any United States agency, such agency shall review with the U.S. Fish and Wildlife Service, Department of the Interior, and with the head of the agency overseeing the wildlife resources of the site.	Applicable if remedial activities would modify streams or other water bodies.

Notes:
ARAR - Applicable or relevant and appropriate requirements
CERCLA - Comprehensive Environmental Response, Compensation and Liabilities Act
PCB - Polychlorinated biphenyls
RCRA - Resource Conservation and Recovery Act
TBC - To be considered